COMMAND TEST

This program consists of a series of tests that check the
functions of the instructions on the 1219 Computer. These
tests are connected and controlled by an executive routine
(COMA). Included within the command executive routine is
a sequential updating of the ICR, thereby enabling one cycle
of the command executive to check all instruction except
Input/Output and the Enable Real Time Clock instructions,
and the operational validity of all index registers.

The operator has the option of selecting either or both a
computer console error display or an error typeout. If
PROGRAM STOP 0 is set and an error is detected, the test,
will stop and display the function code in the uppermost
bits of the CO register. In those tests which use test pat-
terns, correct versus incorrect bit information will be dis-
played in the AU and AL registers. AU will contain the
correct bit configuration and AL will contain the incorrect
bit configuration. However, on the tests for function codes
10, 11 and 62 the display will be reversed with AL containing
the correct bit configuration and AU the incorrect. The
shift function codes have shift count and bit error display.
If PROGRAM SKIP 4 is not set, Typeout Subroutines will
provide the operator with a typeout of the status of the
Command Test. If an error is detected and PROGRAM SKIP 4 is
not set, the function code of the erring instruction will be
buffered out in an error message. All messages are buffered
out in field data code via channel 0.

The Command Test may be run separately or as a part of the
Integrated Command-Arithmetic test. If it is run separately
PROGRAM SKIP 2 must be set to remain in Command Test.

The following is the operating procedure for the COMMAND TEST:

> a. Disconnect the RTC
> b. Load the COMMAND TEST PROGRAM or the INTEGRATED
>   TEST PROGRAM. The jumps and stops for this
>   program are as specified in the following table.

PROGRAM SWITCH	PROGRAM ACTION
PROGRAM SKIP 0	Set to recycle current function code sub-routine upon error detection
PROGRAM SKIP 2	Set to remain in COMMAND TEST
PROGRAM SKIP 4	Set to supress typeouts
PROGRAM STOP 0	Set for computer console error display
PROGRAM STOP 2	Set to end COMMAND TEST after a selected number of cycles of the command executive routine. (The number in address NYMB).

> c. Set PROGRAM SKIPS and STOPS as desired according
>   to the above table.

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    d.   Master Clear the Computer.

    e.   Set the 1232/1532 channel number in AL
        bits 6 to 3.

    f.   Set bit AL bit 8 if the I/O Console is a 1532.

    g.   Set AL bits 17-15 as follows:
        Set bit 17 if computer is in 1218 normal mode
        Set bit 16 if computer is in 1218 NTDS mode
        Set bit 15 if computer is in 1219 normal mode

    h.   Insert (if necessary) the plug-in printed wiring
        assembly 7104010 in the location specified as
        follows:
        A4A1J5G if computer is in 1218 normal mode
        A4A1J5F if computer is in 1218 NTDS mode
        A4A1J4G if computer is in 1219 normal mode

    i.   Set P=1501.

    j.   Start the Computer.

SPECIFICATION SYMBOL
SB-10163

TITLE: COMA - 1219B COMMAND TEST EXECUTIVE

DECK IDENTIFIER: FACT

CS-1 LABEL: COMA   KEY: IS LABEL DUPLICATE? No

PROGRAMMER: H W M modified by TLR   DATE: 8 Dec. 67

NUMBER OF L$_4$ OUTPUT INSTRUCTIONS: 161

DESCRIPTION:

This routine is the Executive Control Routine for the 1219 Command
Test. Upon entry into this routine as an individual program or
as a subroutine, references are made to all subroutines which test
the various instructions of the 1219B Computer. This routine
sequentially updates the ICR, thereby ensuring the modification
capability and the operational validity of all index registers
Input/Output and the real time clock instructions are not covered
by this program.

The program is initiated by setting P to 1501 if this routine is to
be used as an individual program, or using address 1500 as the sub-
routine entrance if this routine is to be used as a subroutine.
Upon entering this routine the following header is typed if PROGRAM
SKIP 4 is not set: COMMAND TEST, ERROR DISPLAY AU, AL. Upon
referencing each subroutine and at the completion of the subroutine
run, the control is returned to COMA where PROGRAM SKIP 0 is checked
for the test to continue. If PROGRAM SKIP 0 is set, the subroutine
previously run is re-cycled until PROGRAM SKIP 0 is released.
PROGRAM SKIP 0 may be set upon receiving an error stop during the
running of an error display subroutine. COMA operates in 8 cycle
runs, one for each index register. The 8 cycle runs are counted
and when the number of runs is equal to the contents of address NYMB
an error flag is checked to determine if an error ocurred. If an
error occurred, FAILED RECYCLE is typed. If no error occurred OK
END is typed. After one of these typeouts, PROGRAM STOP 2 is
referenced. If set the test is ended. If not set, PROGRAM SKIP 2
is referenced. If PROGRAM SKIP 2 is set, the program will remain
in COMA. If it is not set, the program exits from COMA.

The typeouts are supressed in the subroutines TYPEC, TYPEF, TYPEO,
TFDIS, and TSDIS, if PROGRAM SKIP 4 is set. PROGRAM STOP 0 is
set during the running of COMA if an error stop is wanted in the
error display subroutines TEDIS and TSDIS.

SPECIFICATION SYMBOL
SB-10163

TITLE: COMA - 1219B COMMAND TEST EXECUTIVE

INPUT PARAMETERS (Listed Sequentially):

SPERRF (Error Flag) from TFDIS and TSDIS

OUTPUT PARAMETERS (Listed Sequentially):

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

TYPT IOSET TYPE TFDIS TSDIS ALL COMMAND TEST SUBROUTINES: TF10, TF11,
TF12, TF13, TF32, TF33, TF36, TF37, TF70, TS73, TF46, TF47, TF44, TF45, TF42, TF43,
TF74, TF75, TF40, TF41, TF14, TF15, TF20, TF21, TF71, TF16, TF17, TF22, TF23, TF24
TF25, TF26, TF27, TF02, TF03, TF06, TF07, TF04, TF05, TF51, TF52, TF53, TF34, TF60
TF61, TF62, TF63, TF64, TF65, TF66, TF67, TF35, TF55, TF76, TF30, TF31, TF73, TF56
TF57, TC61, TC65, TC67, TS62, TS61, TS63, TS60, TS41, TS42. TS43, TS45, TS46, TS47
TS44, TS51, TS52, TS53, TS54, and TS55...

ALARMS AND/OR REMARKS:

SYSTEM DATA REFERENCES:

PROGRAM SKIP 0:   Previously referenced subroutines will recycle until
PROGRAM SKIP 0 is set.

PROGRAM SKIP 2: set: Remain in the COMA routine, i.e., do not exit
as from a subroutine

PROGRAM STOP 2 set: STOP TEST at the completion of one 8 cycle run.

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SPECIFICATION SHEET

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SPECIFICATION SYMBOL
SB -10163

COMA

E

COMAO

TYPE
SETUP CHANNEL
NUMBER, 1232/
1532 INTER-
CHANGE

N+1 BUFFER
TERMINATION

N

Y

IOSET
MODIFY BCW
FOR N+1 BUF-
FER TERMINA-
TION

TYPT
PRINT: COM-
MAND TEST
ERROR DISP
PLAY AU,AL

Set command
test pass
count

Set
error flag

Set
ICR
instruction

Clear
ICR
saver

Set
current
ICR

A

TF(S) XX
Test current
function

B

B

PROGRAM
SKIP O
set

S

A

N

All
functions
tested

Yes

C

No

Update index
register to
test next
function

A

C

All index
registers
used to test
functions

Yes

D

No

Update ICR
to next
index
register

A

COMA - 1219B COMMAND TEST EXECUTIVE

COMA - 1219B COMMAND TEST EXECUTIVE (Cont.)

SPECIFICATION SYMBOL
SB-10163

TITLE: TYPE - SETUP CHANNEL NUMBER, 1232/1532 INTERCHANGE

DECK IDENTIFIER: FACT

CS-1 LABEL: TYPE   KEY: _____   IS LABEL DUPLICATE? No

PROGRAMMER: TLR   DATE: 8 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 25

DESCRIPTION:

This subroutine inserts the 1232/1532 channel number in all I/O
instructions. It also modifies the TYPT subroutine so as to
accept either 1232 or 1532 coded data.

SPECIFICATION SYMBOL
SB-10163

TITLE: TYPE

INPUT PARAMETERS (Listed Sequentially):

ALPARM - Initial AL input parameter

OUTPUT PARAMETERS (Listed Sequentially):

T$1
T$2   } I/O instructions with channel number inserted
T$3
T$4

RNOOP { RJP·CONVER if 1232 selected
       { ADDALK·40 if 1532 selected

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

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SPECIFICATION SHEET

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TYPE

INSERT 1232/
1532 CHANNEL
NUMBER IN ALL
I/O COMMANDS

1232 SE-
LECTED

No

RNOOP EQ
ADDACK-40

Yes

RNOOP EQ
RJP.CONVER

EXIT
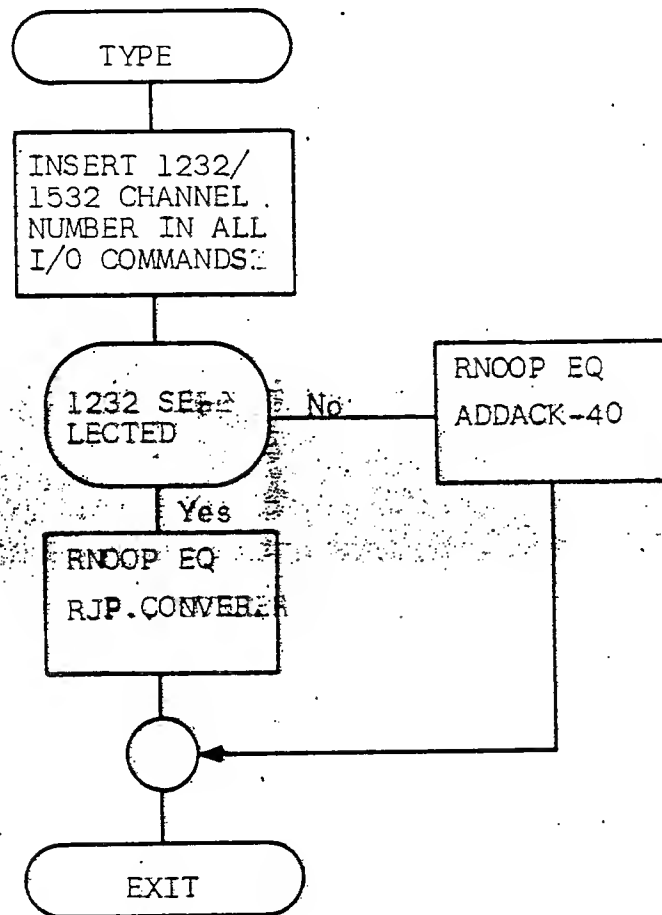
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PROGRAM DATA PAGE

SPECIFICATION SYMBOL
SB-10163

TITLE: IOSET

DECK IDENTIFIER: FACT

CS-1 LABEL: IOSET   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: TLR   DATE: 8 DEC. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 10

DESCRIPTION:

This subroutine modifies output and external function buffers for
N+1 Termination.

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SPECIFICATION SYMBOL
SB-10163

TITLE: IOSET

INPUT PARAMETERS (Listed Sequentially):
T$1+2
T$2+2

OUTPUT PARAMETERS (Listed Sequentially):
T$1+2
T$2+1

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

A-1975

```
                    ( IOSET )

                +----------------+
                | ADD 1 TO       |
                | TERMINAL       |
                | OUTPUT         |
                | BCW            |
                +----------------+

                +----------------+
                | ADD 1 TO TER-  |
                | MINAL EXTERNAL |
                | FUNCTION       |
                | BCW            |
                +----------------+

                    ( EXIT )
```

	SPECIFICATION SYMBOL
	SB-10163

TITLE: TFDIS - Error display for type 1 instructions

DECK IDENTIFIER: FACT

CS-1 LABEL: TFDIS   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: TLR   DATE: 8 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 58

DESCRIPTION:

This subroutine, TFDIS, displays errors for type 1 instructions.

PROGRAM SKIP 4 is referenced when TFDIS is entered. If PROGRAM SKIP 4 is set the error display will be in the CO, AU, and AL registers only. If PROGRAM SKIP 4 is not set there will be an error typeout followed by the console register error display. The console register error display displays the errors if PROGRAM STOP 0 is set.

If PROGRAM SKIP 4 is set, CO is entered with the function code in error and PROGRAM STOP 0 is referenced. If PROGRAM STOP 0 is set, the program stops, displaying the function code in CO and appropriate patterns in AU and AL. Upon restarting, or if PROGRAM STOP 0 is not set, CO is cleared and an exit is made from the subroutine. If PROGRAM SKIP 4 is not set, the error flag in COMA is set, the printer is enabled and Function Code XX typed. The printer is disabled and the console register display portion of TFDIS is entered.

SPECIFICATION SYMBOL
SB-10163

TITLE: TFDIS - Error display subroutine for type 1 instructions

INPUT PARAMETERS (Listed Sequentially):

ALL Type 1 Instructions
$BUFF_1$
$BUFF_2$
TFX

OUTPUT PARAMETERS (Listed Sequentially):
SPERRF (Error Flag)
Buffer BUFF to BUFF2 (FUNCTION CODE XX)

AENORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):
COMA
ALL COMMAND TEST SUBROUTINES

SYSTEM DATA REFERENCES:
PROGRAM SKIP 4 set: error typeout not wanted, continue with console
error display   not set: error typeout
(Function Code XX)
PROGRAM STOP 0 set: stop for console error display

ALARMS AND/OR REMARKS:
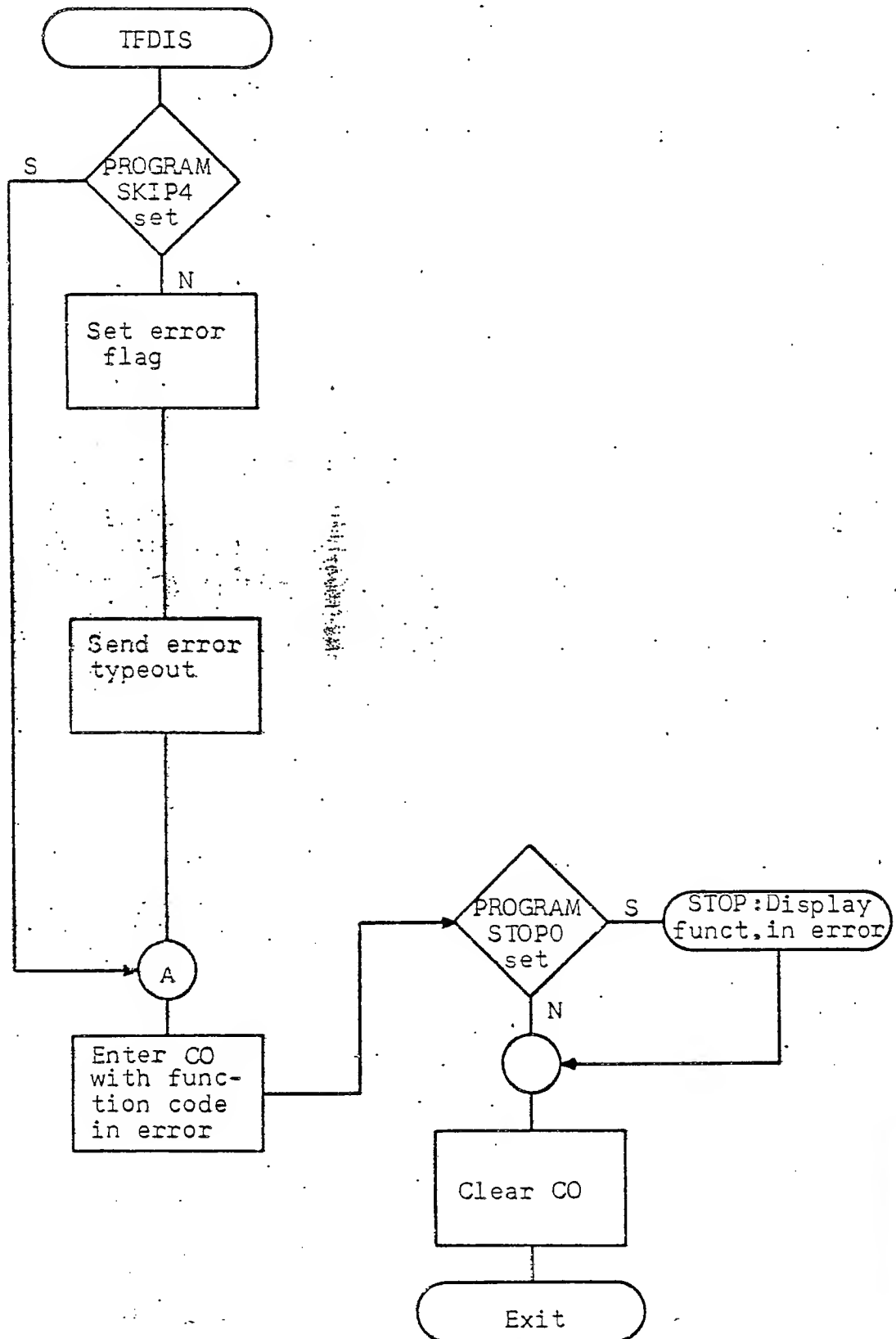
SPECIFICATION SYMBOL
SB-10163

```
                    ( TFDIS )
                        |
          S         /  PROGRAM  \
      <-------------<    SKIP4    >
      |              \    set    /
      |                   | N
      |              +-----------+
      |              | Set error |
      |              |   flag    |
      |              +-----------+
      |                   |
      |              +-----------+
      |              | Send error|
      |              |  typeout  |
      |              +-----------+
      |                   |
      |                  (A)
      |                   |
      |              +-----------+                                    S    /-----------------\
      |              | Enter CO  |----------->  /  PROGRAM  \ ------------->( STOP:Display    )
      |              | with func-|              <   STOPO    >               ( funct.in error )
      |              | tion code |              \    set    /               \-----------------/
      |              | in error  |                   | N                            |
      |              +-----------+                  ( )  <-----------------------------+
      |                                              |
      |                                         +-----------+
      |                                         | Clear CO  |
      |                                         +-----------+
      |                                              |
      |                                           ( Exit )
```

TFDIS - ERROR DISPLAY SUBROUTINE FOR TYPE 1 INSTRUCTIONS

SPECIFICATION SYMBOL
SB-10163

TITLE: TSDIS - Error display for type 2 instructions

DECK IDENTIFIER: FACT

CS-1 LABEL: TSDIS   KEY: IS LABEL DUPLICATE? No

PROGRAMMER: TLR   DATE: 8 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 27

DESCRIPTION:

This subroutine, TSDIS, displays errors for type 2 instructions.

PROGRAM SKIP 4 is referenced when TSDIS is entered. If PROGRAM SKIP 4 is set the error display will be in the CO, AU and AL registers only. If PROGRAM SKIP 4 is not set there will be an error typeout followed by the console register error display. The console register error display displays the errors if PROGRAM STOP O is set.

If PROGRAM SKIP 4 is set, CO is entered with the function code in error and PROGRAM STOP O is referenced. If PROGRAM STOP O is set the program stops, displaying the function code in CO and appropriate patterns in AU and AL. Upon restarting or if PROGRAM STOP O is not set, CO is cleared and an exit is made from the subroutine. If PROGRAM SKIP 4 is not set the error flag in COMA is set. The printer is enabled and the message, Function Code 50XX, typed. The printer is disabled and the console register display portion of TSDIS is entered.

| SPECIFICATION SYMBOL |
| SB-10163 |

TITLE: TSDIS - Error display for type 2 instructions

INPUT PARAMETERS (Listed Sequentially):

All Type 2 Instructions

BUFF 1
BUFF 2
BUFF 3
BUFF 4
TFX

OUTPUT PARAMETERS (Listed Sequentially):

SPERRF (Error Flag)
Buffer BUFF to BUFF2 (FUNCTION CODE XXXX)

ABNORMAL EXITS (Listed Sequentially):

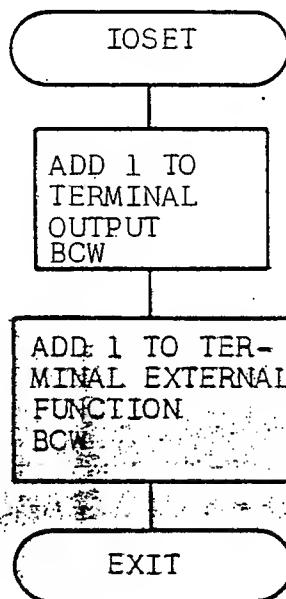NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA

ALL COMMAND TEST SUBROUTINES

SYSTEM DATA REFERENCES:

PROGRAM SKIP 4 set: error typeout not wanted, continue with register
                      error display
PROGRAM STOP O set: stop for error display

ALARMS AND/OR REMARKS:

SPECIFICATION SYMBOL
SB-10163

```
                    ( TSDIS )
                       │
                      ╱ ╲
                     ╱   ╲
          S    ╱ PROGRAM ╲
      ┌───────╱   SKIP4    ╲
      │       ╲   set      ╱
      │        ╲          ╱
      │         ╲   │    ╱
      │            N│
      │        ┌─────────┐
      │        │ Set error│
      │        │  flag    │
      │        └─────────┘
      │             │
      │        ┌─────────┐
      │        │Send error│
      │        │ typeout  │
      │        └─────────┘
      │             │
      └──────────→ (  )
                    │
              ┌──────────┐
              │ Enter Co │
              │with Func-│
              │tion Code │
              │in Error  │
              └──────────┘
                    │
                   ╱ ╲
         N        ╱   ╲
      ┌─────────╱PROGRAM╲
      │         ╲STOP O  ╱
      │          ╲ set  ╱
      │           ╲    ╱
      │          S │
      │    ( STOP:DISPLAY )
      │    ( funct.in error)
      │             │
      └──────────→ (  )
                    │
              ┌──────────┐
              │ Clear Co │──────( Exit )
              └──────────┘
```
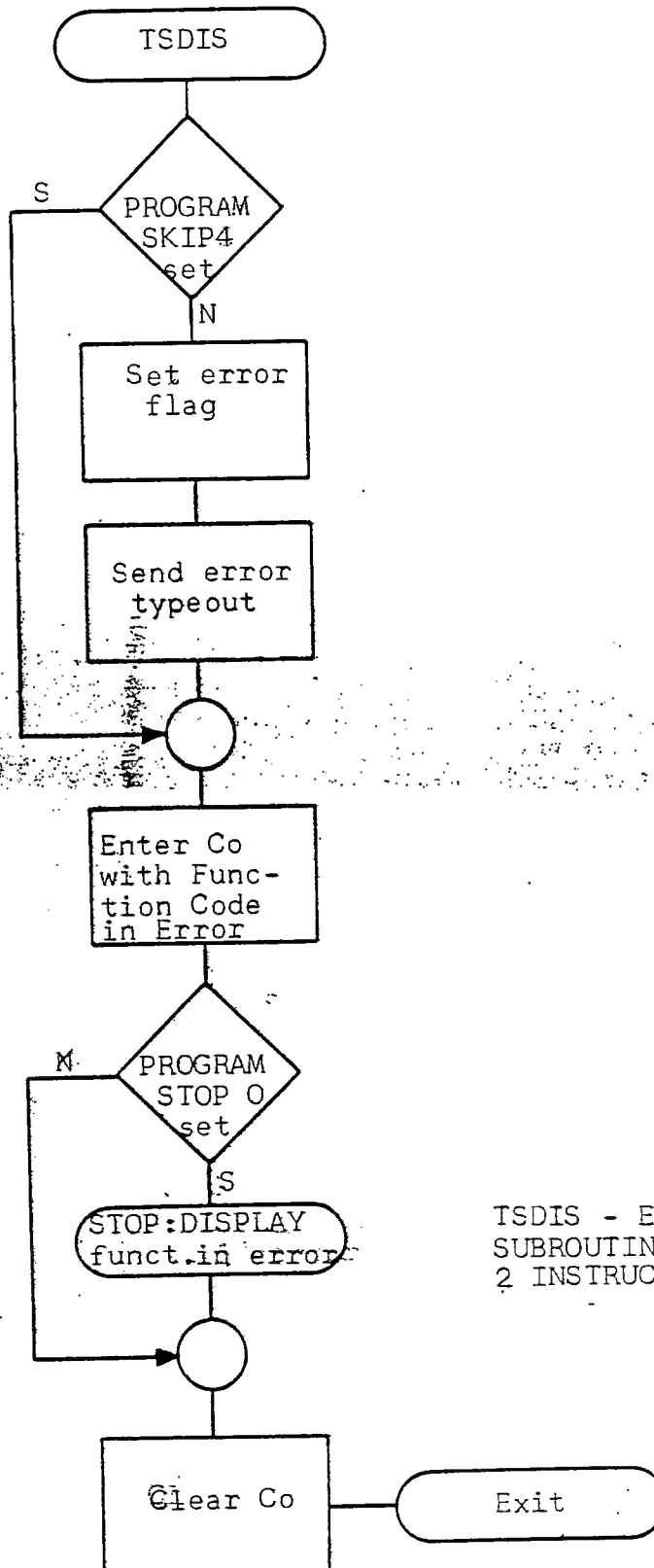
TSDIS - ERROR DISPLAY
SUBROUTINE FOR TYPE
2 INSTRUCTIONS

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PROGRAM DATA PAGE

SPECIFICATION SYMBOL
SB-10163

TITLE: TPAT - TEST PATTERNS FOR COMA

DECK IDENTIFIER: FACT

CS-1 LABEL: TPAT   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: P M C modified by TLR   DATE: 8 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 83

DESCRIPTION:

This subroutine contains all the normal test patterns and constants used in COMA.

Also contained within TPAT are the shift set up (17 & 22) for the testing of shift instructions.

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SPECIFICATION SHEET

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SPECIFICATION SYMBOL
SB-10163

TITLE: TPAT - TEST PATTERNS FOR COMA

INPUT PARAMETERS (Listed Sequentially):

OUTPUT PARAMETERS (Listed Sequentially):

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

All COMA Subroutines

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

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SPECIFICATION SYMBOL

SB-10163

TITLE: TF02-COMPARE A LOWER WITH Y (02xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF02   KEY: _____   IS LABEL DUPLICATE? No

PROGRAMMER: F W S modified by TLR   DATE: 8 Dec. 67

NUMBER OF L$_4$ OUTPUT INSTRUCTIONS: 45

DESCRIPTION:

This subroutine tests the Compare A Lower with Y instruction
(Function Code 02). Patterns are entered into AL and shifted for a
sliding ones and sliding zero patterns. A CMAL instruction is then
executed utilizing an associated pattern. The jump equals and jump
not equals instructions are used for checking validity of each execu-
tion. If all execution is correct an exit is made to the executive
routine (COMA). If an error is detected, the correct bit configura-
tion is entered into A Upper, the incorrect into A Lower, and an
exit is made to the display subroutine (TFDIS). Upon return from
TFDIS an exit is made to the executive routine (COMA) for continuing
the test or recycling this subroutine.

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SPECIFICATION SYMBOL
SB-10163

TITLE:　TF02 - COMPARE A LOWER WITH Y (02xxxx)

INPUT PARAMETERS (Listed Sequentially):

COMA.　　　　　　　　　TEST PATTERNS

```
TPAT1    -00.0000
TPAB1    -00.0001
TCO      -77.7776
```

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1
BUFF2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA
TFDIS (Error Display)

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:
　　PROGRAM SKIP 4 - set for error display only
　　　　　　　　　　　not set for error typeout (Function Code 02)
　　PROGRAM STOP 0 - A Upper contains correct information
　　　　　　　　　　　A Lower contains incorrect information
　　　　　　　　　　　CO contains the function code (02xxxx)
　　PROGRAM SKIP 0 - not set to continue test
　　　　　　　　　　　set to recycle subroutine(TF02)

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SPECIFICATION SHEET

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SPECIFICATION SYMBOL
SB-10163

```
        ( TF 02 )                            ( A )
            |                                  |
  +------------------+                  /--------------\
  | Store func-      |                 /     TFDIS      \
  | tion code in     |                 \    Error        /
  | display          |                  \   display     /
  | cells            |                   \-------------/
  +------------------+                         |
            |                                ( C )
  +------------------+
  | Setup shift      |
  | count 17         |
  +------------------+
            |
  +------------------+
  | Clear AU         |
  | Clear AL         |
  +------------------+
            |
   No    /        \
( A )---(  AL zero  )
         \        /
           Yes
  +------------------+
  | Enter AU         |                              (   )
  | with pat-        |                                |
  | tern             |                        +----------------+
  | (000001)         |                        |  LSH AL 1X     |
  +------------------+                        +----------------+
            |                                         |
   Yes   /          \                 Yes    /          \
( A )---( AL = 000001 )            ( A )----( AL = 000001 )
         \          /                        \          /
           No                                   No
  +------------------+                       /          \    No
  | Enter AL         |                      ( Shift count )---
  | with pattern     |                       \    0       /
  | (000001)         |                        \          /
  +------------------+                            Yes
            |                                      |
   No    /          \  Yes                        ( B )
( A )---( AL = 000001 )                     Y
         \          /
```

TF02 - COMPARE AL WITH Y   02XXXX

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(B)

```
Setup shift
count 17
```

```
Enter AL
with pattern
(777776).
```

```
Enter AU
with pattern
(777776)
```

AL = 777776 — No → (A)

Yes

( )

```
LSH AL 1X
```

AL = 777776 — Yes → (A)

No

Shift count 0 — No → (back to circle)

Yes

```
Clear AL
```

AL ≥ 777776 — No → (A)

Yes

```
Enter AL
with pattern
(777776)
```

AL < 000001 — No → (A)

Yes

(C)

(Exit)

TF02 – COMPARE AL WITH Y 02XXXX (Cont.)

SPECIFICATION SYMBOL
SB-10163

TITLE: TF03 - TEST COMPARE AL TO Y+B (03xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF03   KEY: _____   IS LABEL DUPLICATE? No

PROGRAMMER: F W S modified by TLR   DATE: ____ 8 Dec. 67

NUMBER OF L₄ OUTPUT INSTRUCTIONS: ____ 32

DESCRIPTION:

This subroutine checks the Compare A Lower To Y + B instruction
(Function Code 03). A Lower is entered with a pattern after which
a CMALB is executed and verified with a Jump Equals instruction.
If correct, the pattern is shifted and the 03 instruction is again
executed and verified. If correct a B Skip instruction is used to
update B while patterns are entered into AL as a result of an add
ALK. These patterns are also utilized for the execution of an 03
instruction and verified with a Jump Equals. If an error is detected
during verification, the correct information is entered into A
Upper, the incorrect into A Lower, and an exit is made to the Dis-
play subroutine (TFDIS). Upon returning to this subroutine (TF03),
an exit is made to the Executive routine (COMA) for continuing the
test or recycling this subroutine.

SPECIFICATION SYMBOL
SB-10163

TITLE: TF03 - TEST COMPARE AL TO Y+B (03xxxx)

INPUT PARAMETERS (Listed Sequentially):

COMA   TEST PATTERNS

TCO   -777776
TPAB7   -000022

OUTPUT PARAMETERS (Listed Sequentially):

BUFF 1
BUFF 2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA (EXEC)
TFDIS (Error Display)

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY   - set for error display only
PROGRAM SKIP 4 - not set for error typeout (Function Code 03)
PROGRAM STOP 0 - Correct information in A Upper
                  incorrect information in A Lower
                  Function code (03xxxx) in CO
PROGRAM SKIP 0 - not set to continue test
                  set to recycle subroutine (TF03)

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```
        ┌──────────────┐
        (   TF 03      )
        └──────┬───────┘
        ┌──────┴───────┐
        │ Store func-  │
        │ tion code    │
        │ in display   │
        │ cells        │
        └──────┬───────┘
        ┌──────┴───────┐
        │              │
        │  Clear B     │
        │              │
        └──────┬───────┘
        ┌──────┴───────┐
        │ Enter AL     │
        │ with pat-    │
        │ tern         │
        │ (777776)     │
        └──────┬───────┘
              ( )
               │
        ┌──────┴───────┐                    ┌──────────────┐
        (AL = pattern ) ──No── (A) ──────── │ Enter AU     │
        (   +B        )                     │ with correct │
        └──────┬───────┘                    └──────┬───────┘
              Yes                             ┌────┴────┐
        ┌──────┴───────┐                      │ TFDIS   │
        │              │                     ╱           ╲
        │  LSH AL 1X   │                    │   Error     │
        │              │                     ╲  display  ╱
        └──────┬───────┘                      └────┬────┘
        ┌──────┴───────┐                           │
        (AL = pattern ) ──Yes──                    │
        (   +B        )                            │
        └──────┬───────┘                           │
              No                                   │
        ┌──────┴───────┐                          ( )
   No── (   B = 22    ) ──Yes─────────────────────┘
        └──────────────┘
                                        ┌──────────────┐
                                        (   Exit       )
                                        └──────────────┘
```
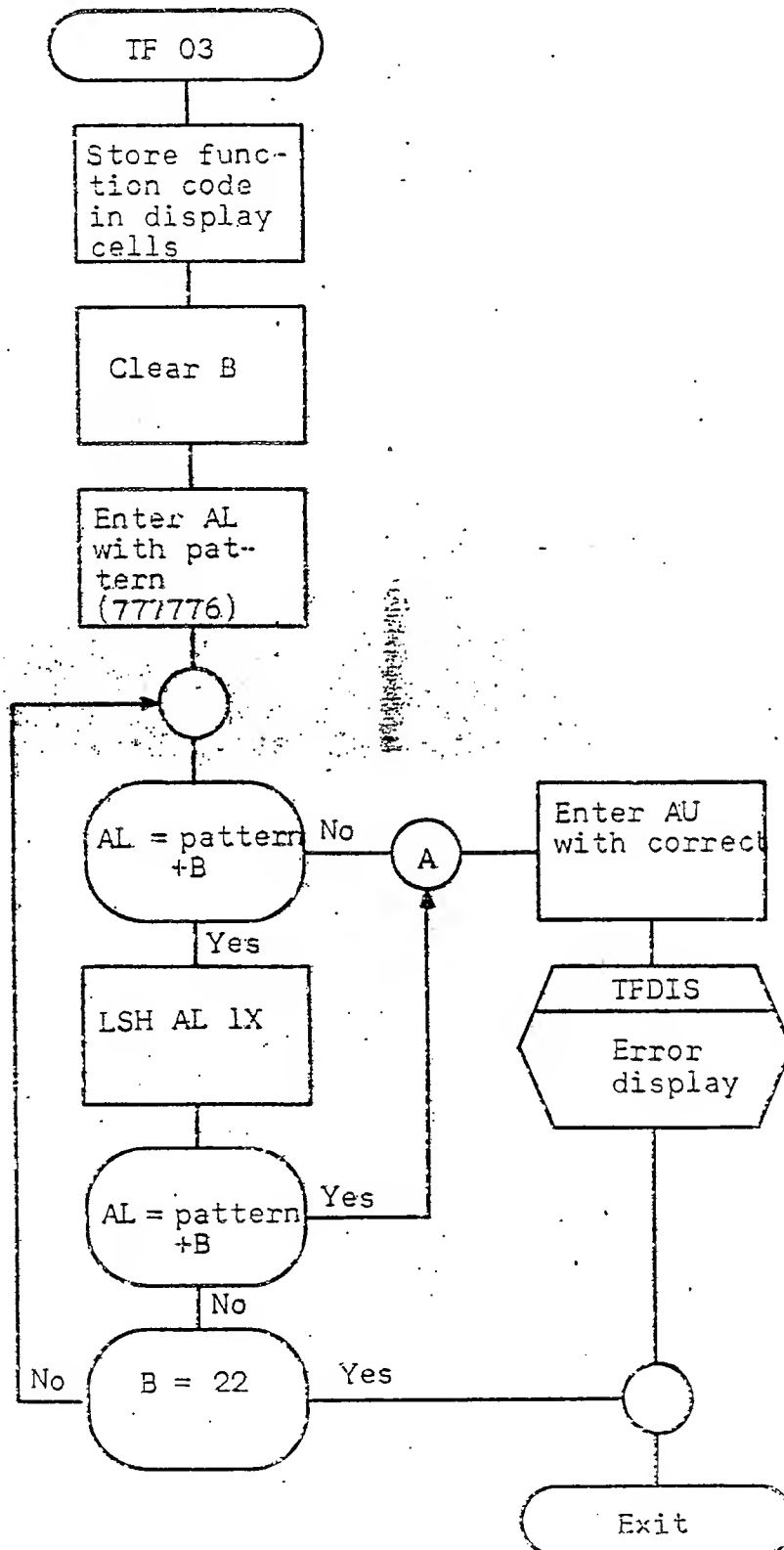
TF03:   COMPARE AL WITH Y+B   03XXXX
                                    Y

SPECIFICATION SYMBOL
SB-10163

TITLE: TF04 - SELECTIVE SUBSTITUTE (04xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF04   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: P M C modified by TLR   DATE: 8 Dec. 67

NUMBER OF L_1 OUTPUT INSTRUCTIONS: 44

DESCRIPTION:

This subroutine checks the Selective Substitute command. A variety
of patterns are brought into AU and AL with a SLSU executed using
a test pattern. At the completion of the Selective Substitute
the result is checked for validity by comparing AL with the correct
information. If correct, the subroutine goes to the next pattern;
when all patterns are complete the subroutine returns to the execu-
tive routine (COMA). If the validity check detects an error, the
correct information is entered into AU; AL will contain the in-
correct. A return jump is then made to the display subroutine where,
with PROGRAM STOP 0 set, the display may be evaluated.

TITLE: TF04 - SELECTIVE SUBSTITUTE (04xxxx)

INPUT PARAMETERS (Listed Sequentially):

COMA

TEST PATTERNS

TPAT1	000000	TPAT7	070707
TPAT2	252525	TPAB1+1	777776
TPAT2+1	252525	TPAT4	770000
TPAT5	007777	TPAK7	777070
TPAT4	770000		
TPAT	777777		
TPAT3	525252		
TPAT3+1	525252		

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1
BUFF2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA - RETURN TO EXEC
TFDIS - ERROR DISPLAY

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DETECTION - PROGRAM STOP O set display of bit error in AL-
                 correct bit configuration in AU - function code
                 in CO (04)

PROGRAM SKIP 4 - set for console error display only,
                 not set for error typeout (Function Code 04)

PROGRAM SKIP O - set to recycle subroutine (TF04)
                 not set to continue test

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SPECIFICATION SHEET

SHEET	194	REVISION	—

SPECIFICATION SYMBOL
SB-10163

```
                    ╭──────────────╮
                    │     TF04     │
                    ╰──────────────╯
                            │
                    ┌──────────────┐
                    │ Store func-  │
                    │ tion code    │
                    │ in display   │
                    │ cells        │
                    └──────────────┘
                            │
                           (○)
                            │
                    ┌──────────────┐
                    │ Enter AU and │
                    │ AL with seq- │
                    │ uential test │
                    │ patterns     │
                    └──────────────┘
                            │
                    ┌──────────────┐
                    │ Selective    │
                    │ substitute on│
                    │ associated   │
                    │ pattern      │
                    └──────────────┘
                            │
                    ╭──────────╮    No    ┌──────────────┐
                    │ Pattern  │─────────▶│ Bit error    │
                    │ valid    │          │ display in   │
                    ╰──────────╯          │ AL           │
                        │ Yes            └──────────────┘
                    ╭──────────╮                 │
              No    │  All     │          ┌──────────────┐
           ◀────────│ patterns │          │ Correct bit  │
                    │ checked  │          │ display in   │
                    ╰──────────╯          │ AU           │
                        │ Yes            └──────────────┘
                                                 │
                       (○)◀──────────    ⬡ TFDIS ⬡
                        │                  Error
                    ╭──────────╮           display
                    │   Exit   │
                    ╰──────────╯
```

TF04:   SELECTIVE SUBSTITUTE

SPECIFICATION SYMBOL
SB-10163

TITLE: TF05 - TEST SELECTIVE SUBSTITUTE PLUS B (05xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF05   KEY: _____   IS LABEL DUPLICATE? No

PROGRAMMER: P M C modified by TLR   DATE: 8 Dec. 67

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 50

DESCRIPTION:

This subroutine tests the Selective Substitute Plus B command
(Function Code 05). A variety of patterns are entered into the B
Register, A Upper, and A Lower. Then the SLSUB instruction is
executed and checked for proper execution by a comparison with an
associated pattern. If execution was proper, the next set of
patterns is used. This continues until all sets have been used
and verified. If all are correct an exit is made to the Executive
routine (COMA). If an error is detected, the correct information
is entered in A Upper; A Lower contains the incorrect information,
and an exit is made to the Display subroutine (TFDIS). Upon re-
turning to this subroutine (TF05) an exit is made to the Executive
routine (COMA) for continuing the test or recyclying this sub-
routine (TF05).

	SPECIFICATION SYMBOL
	SB-10163

TITLE: TF05 - TEST SELECTIVE SUBSTITUTE PLUS B (05xxxx)

INPUT PARAMETERS (Listed Sequentially):

COMA   TEST PATTERNS

TPAB1	-000001	TPAS4	-000002
TPAT1	-000000	TPAS7	-777775
TPAT2+1	-252525	TPAS5	-000004
TPAT3	-525252	TPAT7	-070707
TPAT5	-007777	TPAK7	-077070
TPAT4	-770000		
TPAT	-777777		
TPAB1+1	-777776		

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1
BUFF2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):
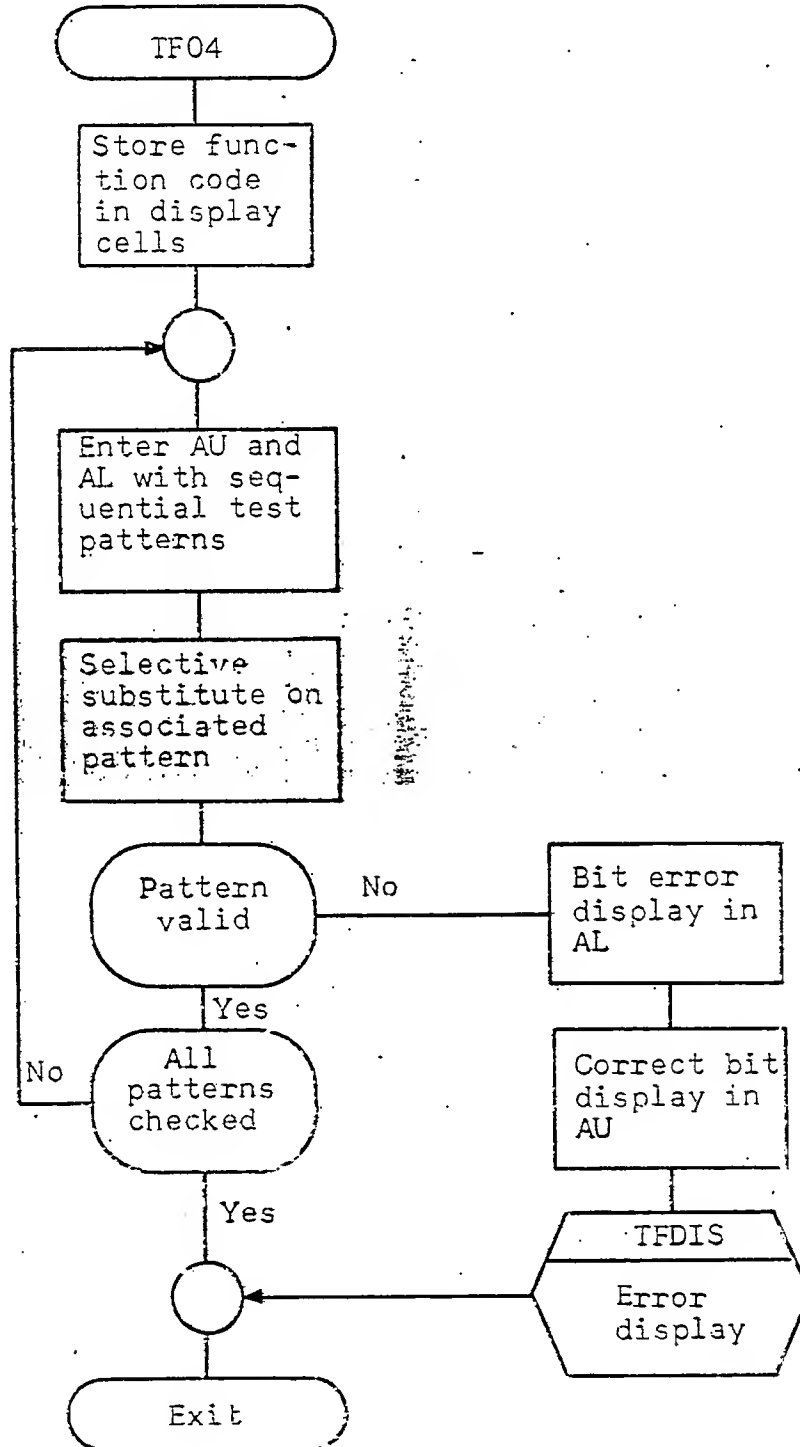
COMA (EXEC)
TFDIS (Error Display)

SYSTEM DATA REFERENCES:
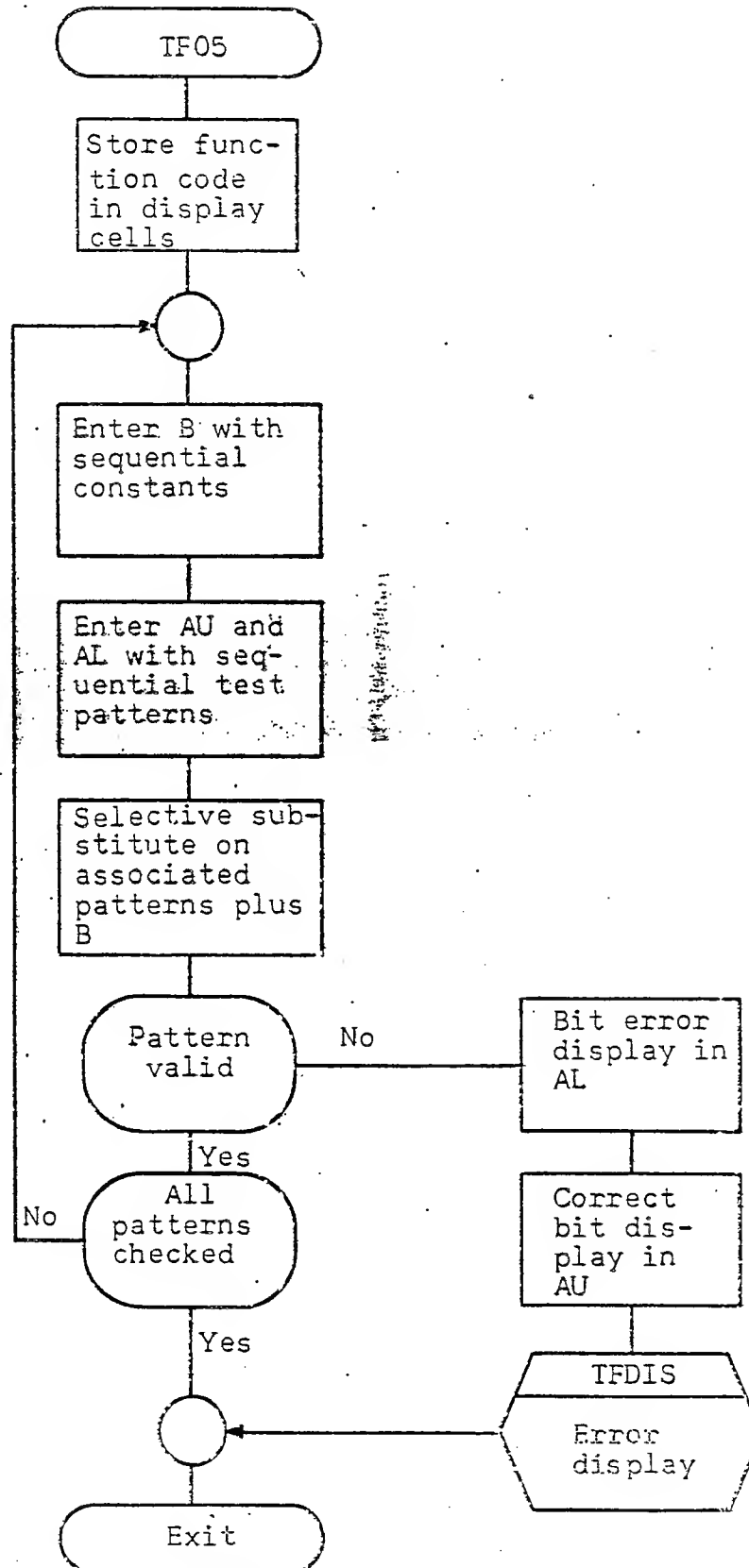
ALARMS AND/OR REMARKS:

ERROR DISPLAY
PROGRAM STOP 0 -   Correct information in A Upper
                 Incorrect information in A Lower
                 Function code (05xxxx) in CO
PROGRAM SKIP 4 -   Set for console error display only
                 Not set for error typeout (Function code 05)
PROGRAM SKIP 0 -   Not set to continue test
                 Set to recycle S/R (TF05)

```
                    ╭─────────────╮
                    │    TF05      │
                    ╰─────────────╯
                          │
                ┌───────────────────┐
                │ Store func-       │
                │ tion code         │
                │ in display        │
                │ cells             │
                └───────────────────┘
                          │
                         (○)
                          │
                ┌───────────────────┐
                │ Enter B with      │
                │ sequential        │
                │ constants         │
                └───────────────────┘
                          │
                ┌───────────────────┐
                │ Enter AU and      │
                │ AL with seq-      │
                │ uential test      │
                │ patterns          │
                └───────────────────┘
                          │
                ┌───────────────────┐
                │ Selective sub-    │
                │ stitute on        │
                │ associated        │
                │ patterns plus     │
                │ B                 │
                └───────────────────┘
                          │
                   ╭────────────╮          ┌───────────────┐
                   │  Pattern   │   No      │ Bit error     │
                   │  valid     │─────────→ │ display in     │
                   ╰────────────╯           │ AL            │
                        │ Yes               └───────────────┘
                   ╭────────────╮                  │
         No        │  All       │           ┌───────────────┐
    ┌───────────── │ patterns   │           │ Correct       │
    │              │ checked    │           │ bit dis-      │
    │              ╰────────────╯           │ play in       │
    │                   │ Yes               │ AU            │
    │                                       └───────────────┘
    │                                              │
    │                  (○) ←───────────── ⬡ TFDIS
    │                   │                    Error
    │                   │                   display
    │              ╭───────────╮
    └──────────→   │   Exit    │
                   ╰───────────╯
```

TF05:   SELECTIVE SUBSTITUTE PLUS B

SPECIFICATION SYMBOL
SB-I0163

TITLE: TF06 - TEST COMPARE MASK (06xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF06   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: F W S modified by TLR   DATE: 8 Dec. 67

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 33

DESCRIPTION:

This subroutine tests the Compare Mask instruction (Function Code 06). A mask is entered into A Upper and, utilizing sliding zero patterns in A Lower, the CMSK instruction is executed and checked for proper execution. If each execution is correct and all patterns have been checked an exit is made to the executive routine (COMA). If an error is detected in one of the checks, the correct pattern is entered into A Upper, A Lower contains the incorrect pattern, and an exit is made to the display subroutine (TFDIS). Upon returing to this subroutine (TF06) an exit is made to the executive routine (COMA) to check for continuing the test or recycling this subroutine (TF06).

SPECIFICATION SYMBOL
SB-10163

TITLE: __TF06 - TEST COMPARE MASK (06xxxx)__

INPUT PARAMETERS (Listed Sequentially):

COMA   TEST PATTERNS
         TPAT   777777

OUTPUT PARAMETERS (Listed Sequentially):
BUFF1
BUFF2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA
TFDIS (Error Display)

SYSTEM DATA REFERENCES:

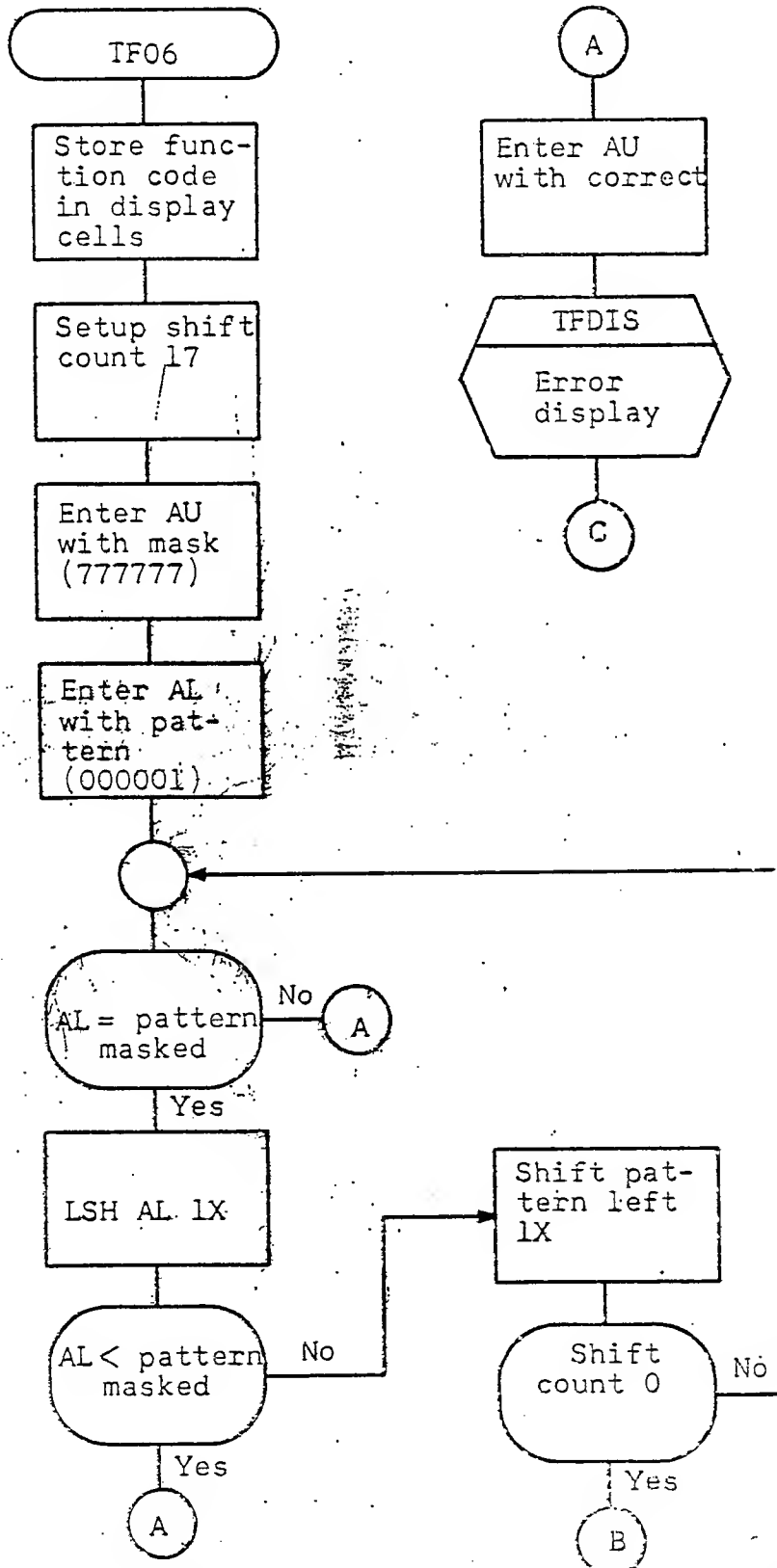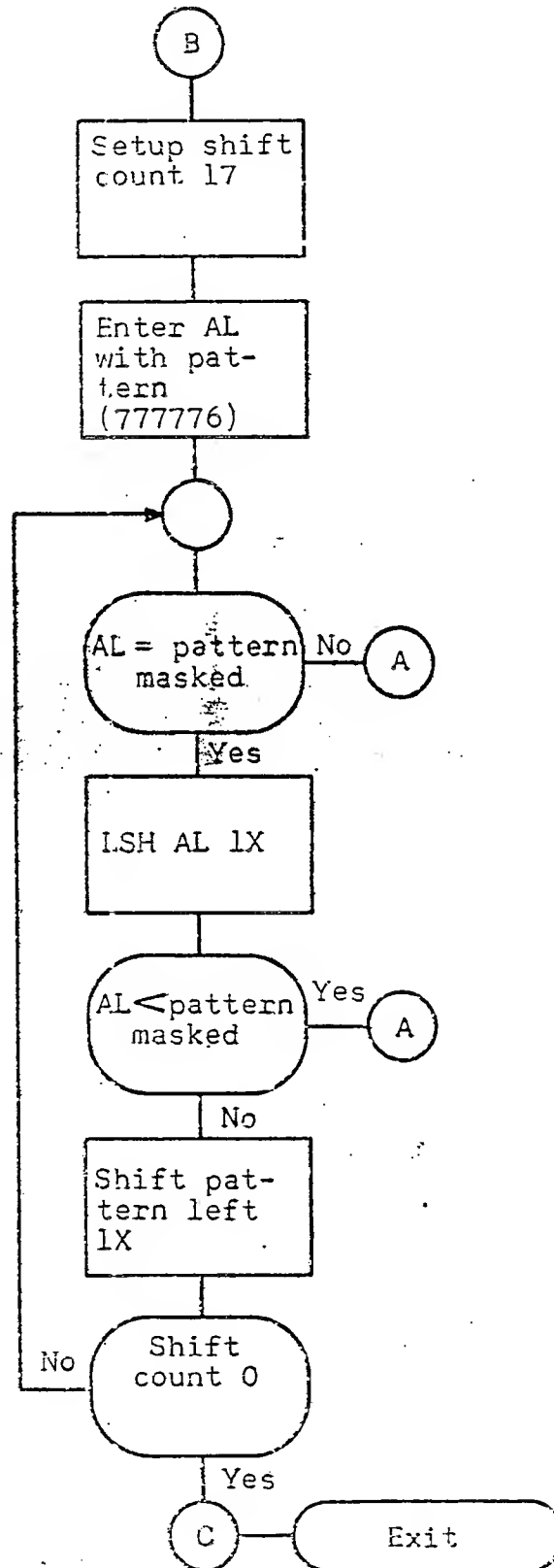ALARMS AND/OR REMARKS:
ERROR DISPLAY
PROGRAM STOP 0 - Correct information in A Upper
                     Incorrect information in A Lower
                     Function code (06xxxx) in CO
PROGRAM SKIP 4 - Set for console error display only
                     Not set for error typeout (Function code 06)
PROGRAM SKIP 0 - Not set to continue test
                     Set to recycle subroutine (TF06)

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SPECIFICATION SYMBOL
SB-10163

```
        ( TF06 )                              ( A )
           |                                    |
  +-----------------+                  +-----------------+
  | Store func-     |                  | Enter AU        |
  | tion code       |                  | with correct    |
  | in display      |                  +-----------------+
  | cells           |                           |
  +-----------------+                  +-----------------+
           |                           |     TFDIS       |
  +-----------------+                  <                 >
  | Setup shift     |                  <     Error       >
  | count 17        |                  <     display     >
  +-----------------+                  +-----------------+
           |                                    |
  +-----------------+                         ( C )
  | Enter AU        |
  | with mask       |
  | (777777)        |
  +-----------------+
           |
  +-----------------+
  | Enter AL        |
  | with pat-       |
  | tern            |
  | (000001)        |
  +-----------------+
           |
          (O)  <------------------------------------+
           |                                        |
     ( AL = pattern )    No                         |
     (   masked     ) -----> ( A )                  |
           |                                        |
          Yes                                       |
  +-----------------+          +-----------------+  |
  |                 |          | Shift pat-      |  |
  | LSH AL 1X       |          | tern left       |  |
  |                 |   +----> | 1X              |  |
  +-----------------+   |      +-----------------+  |
           |           |               |           |
     ( AL < pattern )  |          ( Shift   )  No   |
     (   masked     )--+          ( count 0 )-------+
           |      No               |
          Yes                     Yes
         ( A )                   ( B )       Y
```

TF06:   MASK COMPARE AL WITH L(Y) (AU)   06XXXXX

```
                    ( B )
                      |
            +------------------+
            | Setup shift      |
            | count 17         |
            +------------------+
                      |
            +------------------+
            | Enter AL         |
            | with pat-        |
            | tern             |
            | (777776)         |
            +------------------+
                      |
                    (   )<---------+
                      |            |
            +------------------+   |
           / AL = pattern     \  No    ( A )
           \    masked        /--------
            +------------------+
                      | Yes
            +------------------+
            |                  |
            | LSH AL 1X        |
            |                  |
            +------------------+
                      |
            +------------------+
           / AL < pattern     \  Yes
           \    masked        /--------( A )
            +------------------+
                      | No
            +------------------+
            | Shift pat-       |
            | tern left        |
            | 1X               |
            +------------------+
                      |
     No     +------------------+
    +-------/     Shift        \
    |       \    count 0       /
    |        +------------------+
    |                 | Yes
    +-----------------+
                    ( C )    (  Exit  )
```

TF06:   MASK COMPARE AL WITH L(Y) (AU)   06XXXX
                                          Y

SPECIFICATION SYMBOL
SB-10163

TITLE: TF07 - TEST COMPARE MASK PLUS B (07xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF07 ___ KEY: ___ IS LABEL DUPLICATE? No

PROGRAMMER: F W S modified by TLR ___ DATE: 8 Dec. 67

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 35

DESCRIPTION:

This subroutine tests the Compare Mask Plus B instruction (function
code 07). A mask is entered into A Upper and utilizing a sliding
ones pattern in A Lower, A CMSKB instruction is executed and checked
for proper execution. If correct the next sequential pattern is
checked with the B Register being updated with a B skip instruction.
If all patterns are correct an exit is made to the executive routine
(COMA). If the check on the 07 instruction shows it to be improper,
A Upper is entered with the correct pattern, A Lower contains the
incorrect, and an exit is made to the display subroutine (TFDIS).
Upon returning to this subroutine (TF07) an exit is made to the
executive routine (COMA) to check for continuing the test or re-
cycling this subroutine (TF07).

SPECIFICATION SYMBOL
SB-10163

TITLE: _____TF07_____

INPUT PARAMETERS (Listed Sequentially):

COMA

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1
BUFF2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA
TFDIS (Error Display)

SYSTEM DATA REFERENCES:
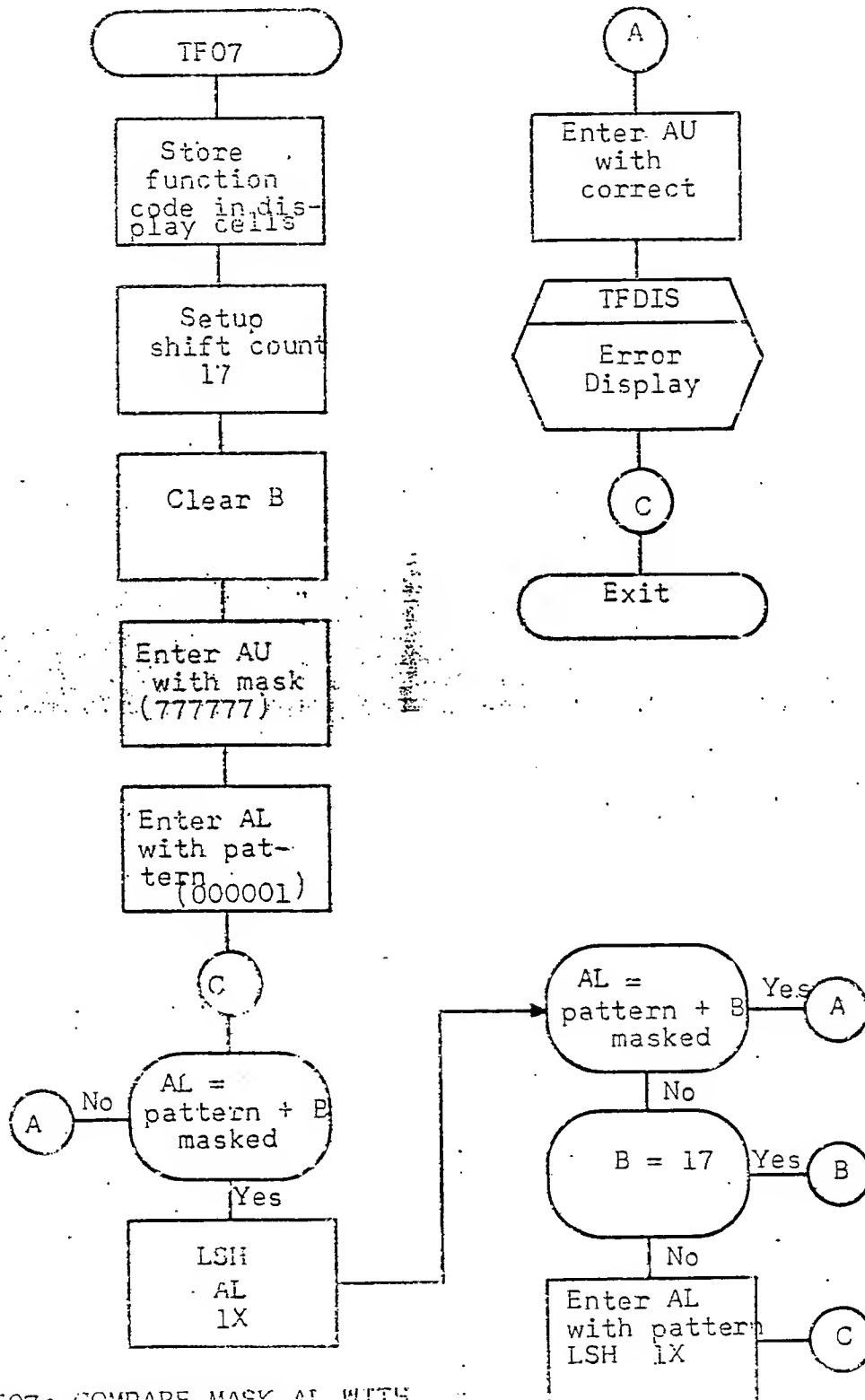
ALARMS AND/OR REMARKS:

ERROR DISPLAY
PROGRAM STOP O - A Upper contains correct information
                 A Lower contains incorrect information
                 CO contains function code (07xxxx)
PROGRAM SKIP 4 - Set for console error display only
                 Not set for error typeout (Function Code 07)
PROGRAM SKIP Q - Not set to continue test
                 Set to recycle subroutine (TF07)

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SPECIFICATION SYMBOL
SB-10163

```
        ( TF07 )                              ( A )

   ┌──────────────┐                     ┌──────────────┐
   │    Store     │                     │   Enter AU   │
   │   function   │                     │     with     │
   │ code in dis- │                     │   correct    │
   │  play cells  │                     └──────────────┘
   └──────────────┘                            │
          │                              ┌──────────────┐
   ┌──────────────┐                      │    TFDIS     │
   │    Setup     │                     ⟨     Error      ⟩
   │ shift count  │                      │   Display    │
   │      17      │                      └──────────────┘
   └──────────────┘                            │
          │                                   ( C )
   ┌──────────────┐                            │
   │   Clear B    │                      ┌──────────────┐
   │              │                     (     Exit       )
   └──────────────┘                      └──────────────┘
          │
   ┌──────────────┐
   │   Enter AU   │
   │  with mask   │
   │   (777777)   │
   └──────────────┘
          │
   ┌──────────────┐
   │   Enter AL   │
   │  with pat-   │
   │    tern      │
   │   (000001)   │
   └──────────────┘
          │
         ( C )
          │
```

```
                                    ┌─────────────┐     Yes
                                   ( AL =         ) ─────── ( A )
                                    ( pattern + B )
                                    ( masked      )
                                      │  No
   ( A ) ── No ──(  AL =        )    ┌─────────────┐     Yes
               ( pattern + B )      (  B = 17       ) ─────── ( B )
               ( masked      )       └─────────────┘
                      │ Yes             │ No
              ┌──────────────┐      ┌──────────────┐
              │     LSH      │      │   Enter AL   │
              │     AL       │      │  with pattern│ ─── ( C )
              │     1X       │      │  LSH   1X    │
              └──────────────┘      └──────────────┘
```

TF07; COMPARE MASK AL WITH
$$L(Y + B)(AU)$$
07XXXX

Y

SPECIFICATION SYMBOL
SB-10163

TITLE: TF10 - TEST ENTER A UPPER (10xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF10   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: P M C modified by TLR   DATE: 8 Dec. 67

NUMBER OF L_A OUTPUT INSTRUCTIONS: 41

DESCRIPTION:

This subroutine checks the Enter A Upper command. A variety of
patterns are entered into AU with an Enter A Upper command. The
result of the ENTAU command is checked for validity by entering
AL with an associated test pattern and comparing A with a constant.
If correct, the subroutine goes to the next pattern. When all
patterns have been checked, the subroutine returns to the executive
routine (COMA). If the validity check detects an error, AU will
contain incorrect information and AL will contain the correct in-
formation. An exit is then made to the display subroutine where,
with PROGRAM STOP 0 set, the function code will be displayed in CO
and the error may be evaluated. Upon returning to this subroutine
(TF10) an exit is made to the executive routine (COMA) to check for
continuing the test or recycling this subroutine.

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SPECIFICATION SYMBOL
SB-10163

TITLE: TF10

INPUT PARAMETERS (Listed Sequentially):

COMA   TEST PATTERNS

TPAT	777777	TPAT4	770000
TPAT+1	777777	TPAT4+1	770000
TPAT1	000000	TPAT5	007777
TPAT1+1	000000	TPAT5+1	007777
TPAT2	252525	TPAT6	707070
TPAT2+1	252525	TPAT6+1	707070
TPAT3	525252	TPAT7	070707
TPAT3+1	525252	TPAT7+1	070707

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1
BUFF2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA - (EXEC)
TFDIS - (Error Display)

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY
PROGRAM STOP 0 - Incorrect information in A Upper
                Correct information in A Lower
                Function code (10xxxx) in CO
PROGRAM SKIP 4 - Set for console error display only
                Not set for error typeout (Function Code 10)
PROGRAM SKIP 0 - Not set to continue program
                Set to recycle test (TF10)
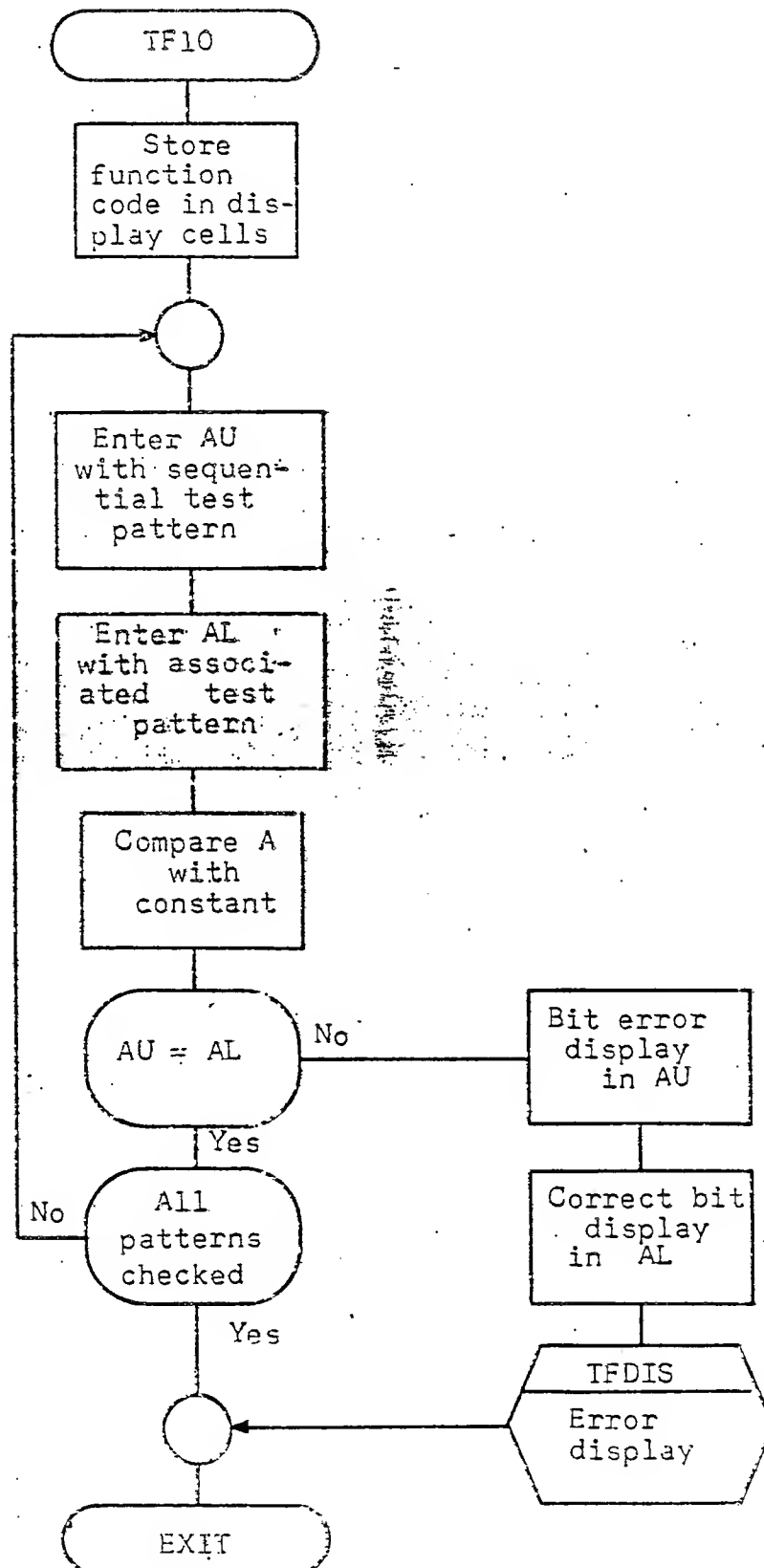
SPECIFICATION SYMBOL
SB-10163

TF10

Store function code in display cells

Enter AU with sequential test pattern

Enter AL with associated test pattern

Compare A with constant

AU = AL

No → Bit error display in AU

Yes

All patterns checked

No

Correct bit display in AL

Yes

TFDIS
Error display

EXIT

TF10: TEST FUNC ENTER A UPPER

SPECIFICATION SYMBOL
SB-10163

TITLE: TF11 - TEST ENTER A UPPER PLUS B (11xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF11   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: P M C modified by TLR   DATE: 8 Dec. 67

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 44

DESCRIPTION:

This subroutine checks the Enter A Upper Plus B command. A B constant is entered into B and then a pattern is entered into AU with an Enter AU Plus B command.

The result of the ENTAUB command is checked for validity by entering AL with an associated pattern and comparing A with a constant. If correct, the subroutine goes to the next pattern using a different B constant. When all patterns have been checked, the subroutine returns to the Executive routine (COMA). If the validity check detects an error, AU will contain the incorrect information and AL the correct information. An exit is then made to the display subroutine where, with PROGRAM STOP 0 is set, the function code will be displayed in CO, and the error display may be evaluated. Upon returning to this subroutine (TF11) an exit is made to the Executive routine (COMA) to check for continuing the test or recycling this subroutine.

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SPECIFICATION SYMBOL
SB-10163

TITLE: TF11

INPUT PARAMETERS (Listed Sequentially):

COMA   TEST PATTERNS

TPAT	777777	TPAT6	707070
TPAT+1	777777	TPAT6+1	707070
TPAT1	000000	B BOX	CONSTANTS
TPAT1+1	000000	TPAB1	000001
TPAT2	252525	TPAB1+1	777776
TPAT2+1	252525	TPAS4	000002
TPAT3	525252	TPAT1	000000
TPAT3+1	525252	TPAS5	000004
		TPAS6	000007
		TPAS7	777775

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1
BUFF2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA - (EXEC)
TFDIS - (Error Display)

SYSTEM DATA REFERENCES:
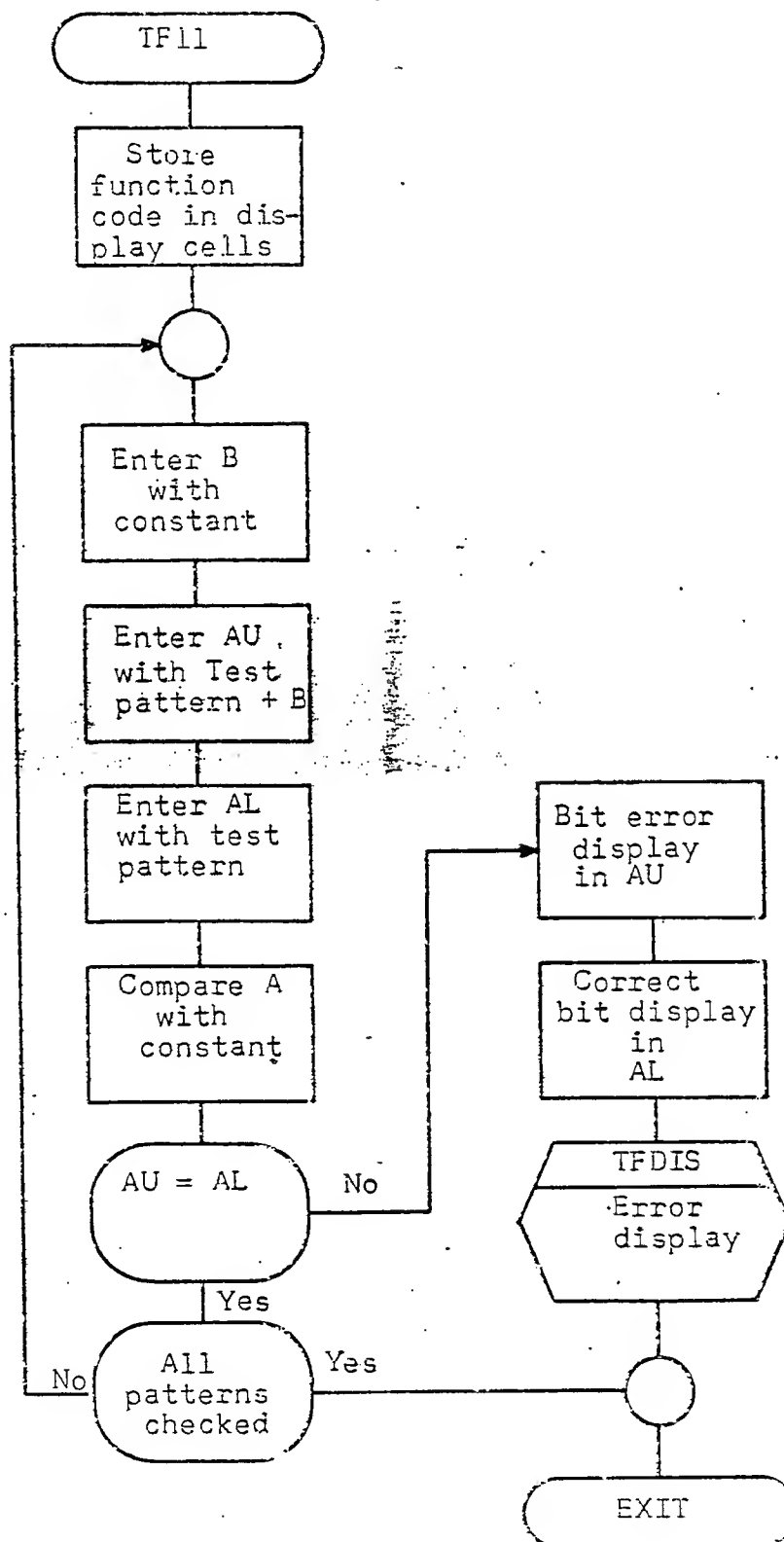
ALARMS AND/OR REMARKS:

ERROR DISPLAY
PROGRAM STOP 0 - Incorrect information in A Upper
                 Correct information in A Lower
                 Function code (11xxxx) in CO
PROGRAM SKIP 4 - Set for error console error display only
                 Not set for error typeout (Function Code 11)
PROGRAM SKIP 0 - Not set to continue test
                 Set to recycle subroutine (TF11)

A-1975

SPECIFICATION SYMBOL
SB-10163

```
                    ( TF11 )
                       |
            +---------------------+
            |       Store         |
            |     function        |
            |   code in dis-      |
            |    play cells       |
            +---------------------+
                       |
                     ( O )
                       |
            +---------------------+
            |     Enter B         |
            |      with           |
            |    constant         |
            +---------------------+
                       |
            +---------------------+            +---------------------+
            |   Enter AU          |            |    Bit error        |
            |   with Test         |            |     display         |
            |  pattern + B        |            |      in AU          |
            +---------------------+            +---------------------+
                       |                                 |
            +---------------------+            +---------------------+
            |   Enter AL          |            |    Correct          |
            |   with test         |            |  bit display        |
            |   pattern           |            |     in              |
            +---------------------+            |     AL              |
                       |                       +---------------------+
            +---------------------+                     |
            |   Compare A         |                +----------+
            |     with            |                |  TFDIS   |
            |   constant          |                |  Error   |
            +---------------------+                | display  |
                       |                          +----------+
                  < AU = AL >   No ------------------+ |
                       |                               |
                     Yes                             ( O )
                       |                               |
              < All patterns >  Yes ------------------+
                  checked                              |
                    |  No                           ( EXIT )
                    +---> (back to O)
```

TF11:   TEST FUNC ENTER A UPPER PLUS B

SPECIFICATION SYMBOL
SB-10163

TITLE: TF12 - TEST ENTER A LOWER (12xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF12   KEY:_____ IS LABEL DUPLICATE? No

PROGRAMMER: P M C modified by TLR   DATE: 8 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 41

DESCRIPTION:

This subroutine checks the Enter A Lower command. A variety of
patterns are entered into AL with an Enter A Lower command. The
result of the ENTAL command is checked for validity by entering
AU with an associated pattern and then comparing A with a constant.
If correct, the subroutine goes to the next pattern. When all
patterns have been checked, the subroutine returns to the Executive
routine (COMA). If the validity check detects an error, AL will
contain the incorrect information and AU the correct information.
An exit is then made to the display subroutine where with PROGRAM
STOP 0 set, the function code will be displayed in CO, and the
error may be evaluated. Upon returning to this subroutine (TF12)
an exit is made to the executive routine (COMA) to check for
continuing the test or recycling this subroutine.

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PROGRAM DATA PAGE (Cont)

SPECIFICATION SYMBOL
SB-10163

TITLE: TF12

INPUT PARAMETERS (Listed Sequentially):

COMA   TEST PATTERNS

TPAT	777777		TPAT4+1	770000
TPAT+1	777777		TPAT5	007777
TPAT1	000000		TPAT5+1	007777
TPAT1+1	000000		TPAT6	707070
TPAT2	252525		TPAT6+1	707070
TPAT2+1	252525		TPAT7	070707
TPAT3	525252		TPAT7+1	070707
TPAT3+1	525252			
TPAT4	770000			

OUTPUT PARAMETERS (Listed Sequentially):

BUFF 1
BUFF 2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA - (EXEC)
TFDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY
PROGRAM STOP O - Incorrect information in A Lower
                Correct information in A Upper
                Function code (12xxxx) in CO
PROGRAM SKIP 4 - Set for console error display only
                Not set for error typeout (Function Code 12)
PROGRAM SKIP O - Not to continue test
                Set to recycle subroutine (TF12)
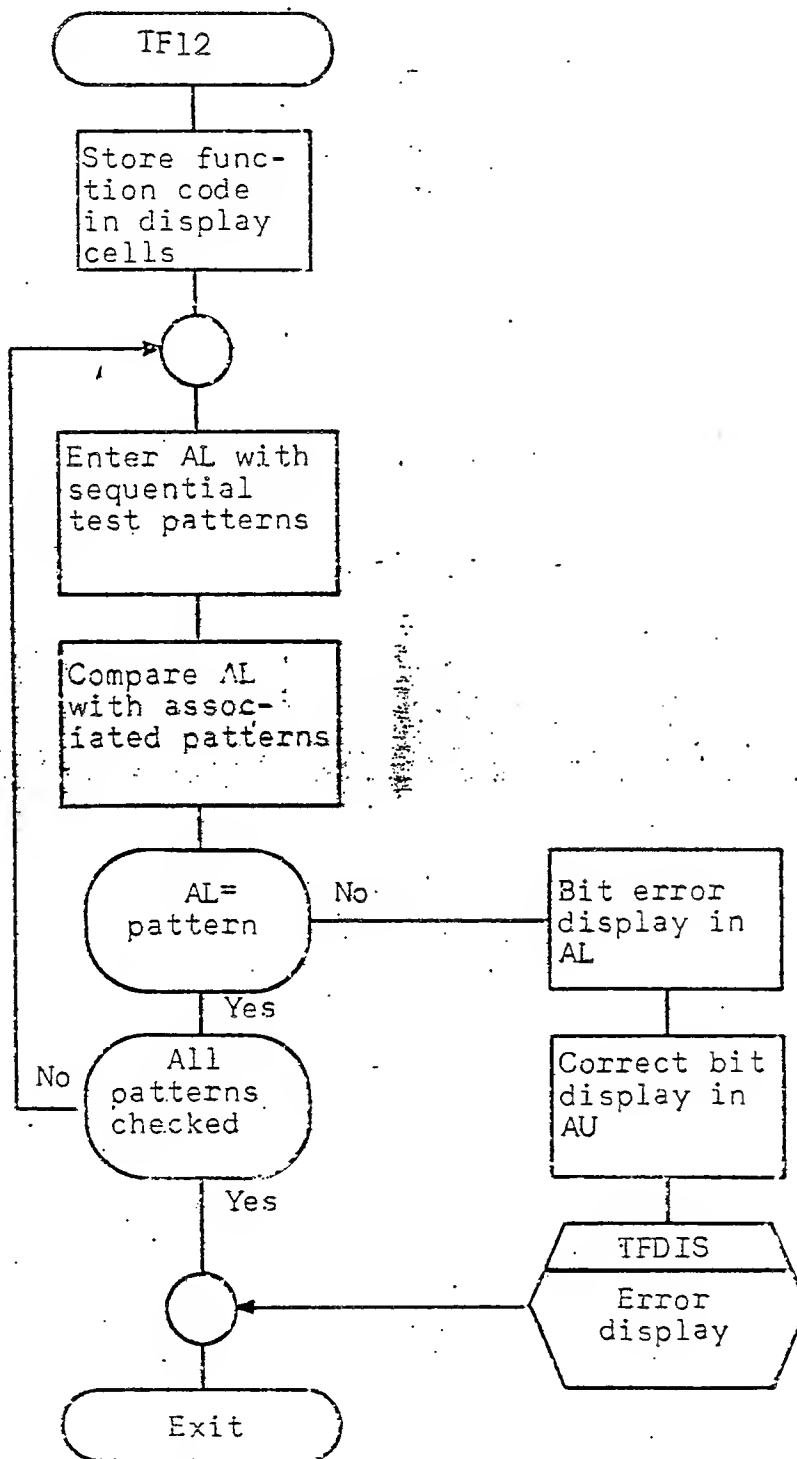
A-1975

SPECIFICATION SYMBOL
SB-10163

```
                    ┌─────────────┐
                    │    TF12      │
                    └──────┬──────┘
                           │
                  ┌────────┴────────┐
                  │ Store func-     │
                  │ tion code       │
                  │ in display      │
                  │ cells           │
                  └────────┬────────┘
                          ( )
                  ┌────────┴────────┐
                  │ Enter AL with   │
                  │ sequential      │
                  │ test patterns   │
                  └────────┬────────┘
                  ┌────────┴────────┐
                  │ Compare AL      │
                  │ with assoc-     │
                  │ iated patterns  │
                  └────────┬────────┘
                      ╱────┴────╲        No     ┌──────────┐
                     │   AL=     │────────────► │ Bit error│
                     │  pattern  │              │ display  │
                      ╲────┬────╱               │ in AL    │
                        Yes                      └────┬─────┘
                     ╱────┴────╲                 ┌────┴─────┐
                    │   All     │ No             │Correct bit│
                    │ patterns  │                │display in │
                    │ checked   │                │AU         │
                     ╲────┬────╱                 └────┬─────┘
                        Yes                      ╱─────┴─────╲
                                                │   TFDIS     │
                        ( )◄───────────────────│   Error      │
                                                │   display    │
                  ┌────────┴────────┐            ╲───────────╱
                  │     Exit        │
                  └─────────────────┘
```

TF12:   TEST FUNC ENTER A LOWER

SPECIFICATION SYMBOL
SB-10163

TITLE: TF13 - TEST ENTER AL MODIFIED BY B (13xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF13 _____ KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: P M C modified by TLR _____ DATE: 8 Dec. 67

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 43

DESCRIPTION:

This subroutine checks the Enter A Lower Modified By B command.
A constant is entered into B and then a pattern is entered into
AL with the Enter AL Plus B command. The execution of the ENTALB
command is checked for validity by entering AU with an associated
test pattern and then comparing A with a constant. If cor-
rect, the subroutine goes on to the next pattern using a dif-
ferent, B-modifying constant. When all patterns have been
checked, the subroutine returns to the Executive routine (COMA).
If the validity check detects an error, AL will contain the in-
correct information and AU the correct information. An exit
then is made to the display subroutine where, with PROGRAM STOP 0
set, the function code will be displayed in CO, and the error
display may be evaluated. Upon returning to this subroutine
(TF13) an exit is made to the Executive routine (COMA) to check
for continuing the test or recycling this subroutine.

SPECIFICATION SYMBOL
SB-10163

TITLE: TF13

INPUT PARAMETERS (Listed Sequentially):

COMA   TEST PATTERNS

TPAT	777777	TPAT6+1	707070	TPAS6	000007
TPAT+1	777777	TPAT7	070707	TPAS7	777775
TPAT1	000000	TPAT7+1	070707		
TPAT1+1	000000	B BOX	CONSTANTS		
TPAT2	252525	TPAB1	000001		
TPAT2+1	252525	TPAB1+1	777776		
TPAT3	525252	TPAS4	000002		
TPAT3+1	525252	TPAT1	000000		
TPAT6	707070	TPAS5	000004		

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1
BUFF2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA - (EXEC)
TFDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY
PROGRAM STOP 0 - Incorrect information in A Lower
                Correct information in A Upper
                Function code (13xxxx) in CQ
PROGRAM SKIP 4 - Set for console error display only
                Not set for error typeout (Function Code 13)
PROGRAM SKIP 0 - Not set to continue test
                Set to recycle subroutine (TF13)

A-1925

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SPECIFICATION SYMBOL
SB-10163

```
           ╭──────────╮
           │   TF13   │
           ╰────┬─────╯
          ┌─────┴──────┐
          │ Store func-│
          │ tion code  │
          │ in display │
          │ cells      │
          └─────┬──────┘
              ( )◄──────────────┐
          ┌─────┴──────┐        │
          │ Enter B with│       │
          │ sequential │        │
          │ constant   │        │
          │            │        │
          └─────┬──────┘        │
          ┌─────┴──────┐        │
          │ Enter AL with│      │
          │ sequential │        │
          │ test pattern│       │
          │            │        │
          └─────┬──────┘        │
          ┌─────┴──────┐        │
          │ Compare AL │        │
          │ with assoc-│        │
          │ iated pattern│      │
          │            │        │
          └─────┬──────┘        │
```

AL = pattern — No → Bit error display in AL

Yes

All patterns checked — No →

Yes

Correct bit display in AU

TFDIS
Error display

Exit
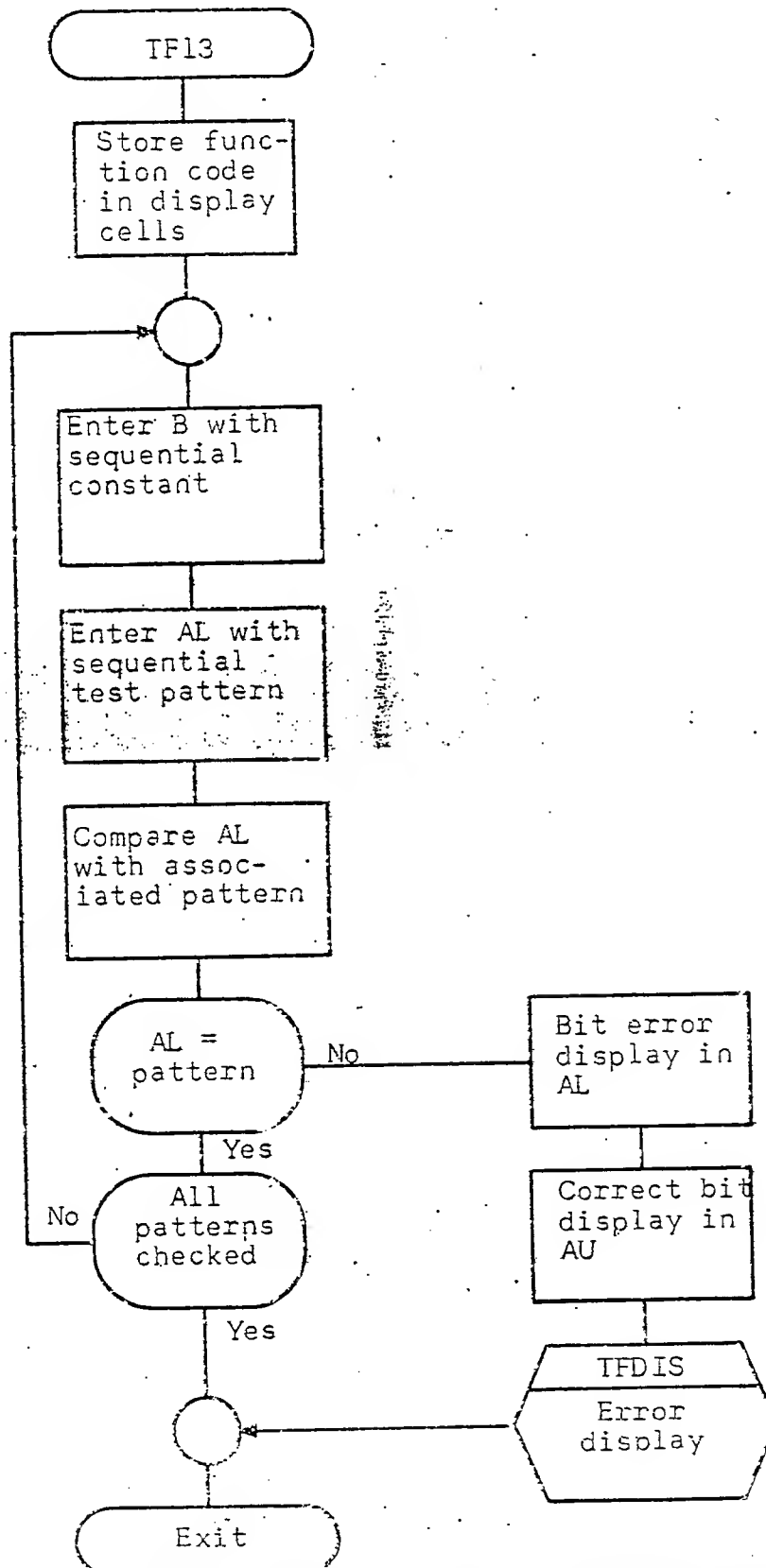
TF13:   TEST FUNC ENTER AL MODIFIED BY B

SPECIFICATION SYMBOL
SB-10163

TITLE: __TF14 - ADD A LOWER PLUS Y (14xxxx)__

DECK IDENTIFIER: __FACT__

CS-1 LABEL: __TF14__   KEY: _____ IS LABEL DUPLICATE? __No__

PROGRAMMER: __F W S modigied by TLR__ DATE: __8 Dec. 67__

NUMBER OF L_4 OUTPUT INSTRUCTIONS: __21__

DESCRIPTION:

This subroutine checks the Add A Lower Plus Y command. A test-
pattern constant is entered into AL, and then an ADDAL command is
executed (Y being another test pattern constant). Then a Jump
command is performed if A is equal to zero, and B is entered with
a constant. (TCO3 containing 377777.) Following this, a B jump
command takes the program to an Add AL plus Y (Y is TPAB1 which
contains a 00001 constant), and then a Jump back is made to the B
Jump command. This is repeated until B is equal to zero. (377777
Add AL plus Y commands). Then a compare is made between AL and a
test pattern at TCO 3 containing 377777. If AL is correct, the
subroutine is returned to the executive routine (COMA). If either
the Jump or A equal zero or the Compare command detects an error,
AU will contain the correct information and the incorrect infor-
mation will be in AL. An exit is then made to the display sub-
routine where, with PROGRAM STOP O set, the function code will be
displayed in CO, and the error display may be evaluated. Upon
returning to this subroutine (TF14) an exit is made to the Exe-
cutive routine (COMA) to check for continuing the test or recycling
this subroutine.

SPECIFICATION SYMBOL
SB-10163

TITLE: TF14

INPUT PARAMETERS (Listed Sequentially):

COMA   TEST PATTERNS

TPAT1	000000
TPAT2	252525
TPAT3	525252
TPAB1	000001
TC03	377777

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1
BUFF2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

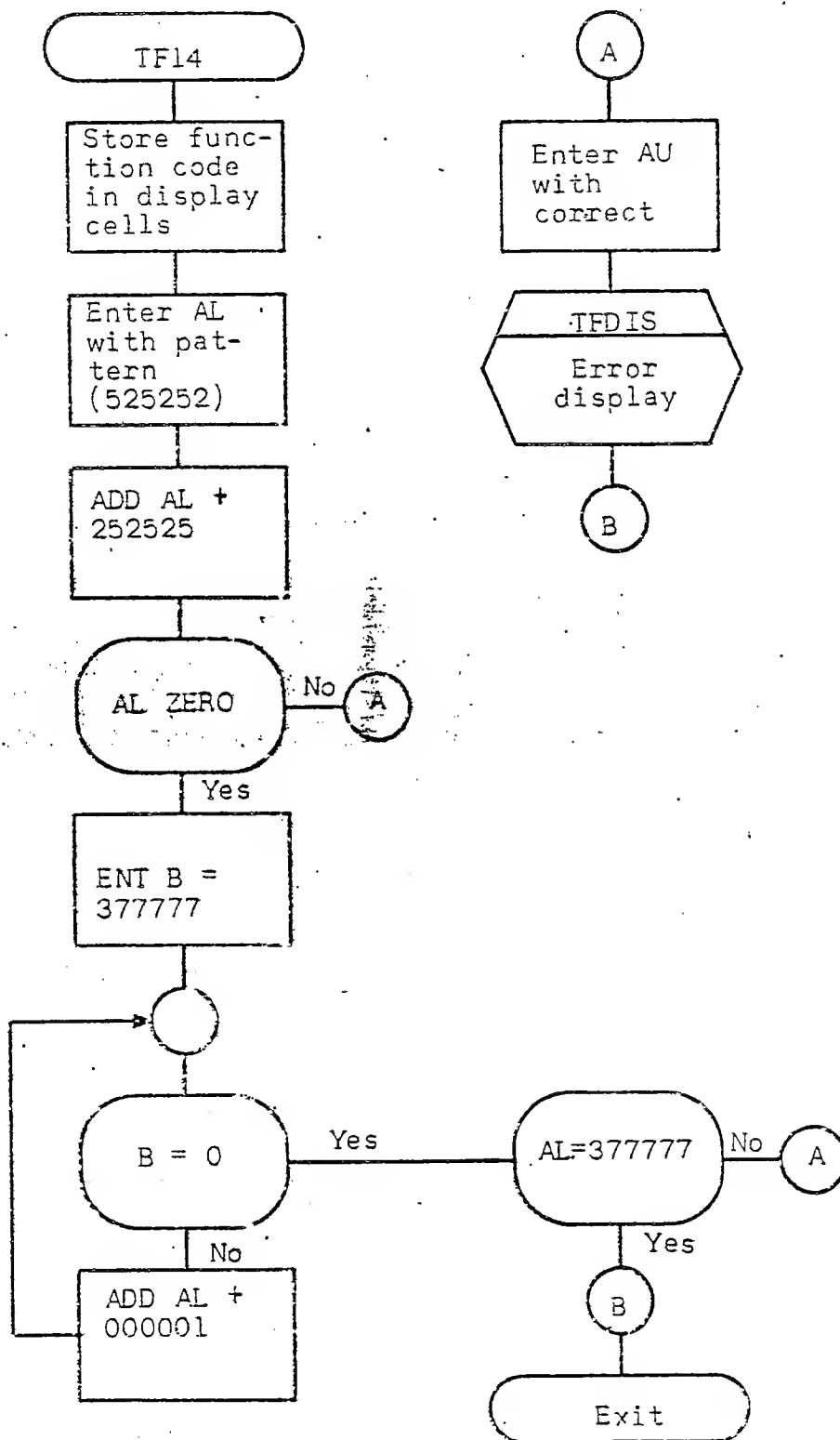COMA - (EXEC)
TFDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY
PROGRAM STOP 0 - Incorrect information in A Lower
                Correct information in A Upper
                Function code (14xxxx) in CO
PROGRAM SKIP 4 - Set for console error display only
                Not set for error typeout (Function Code 14)
PROGRAM SKIP 0 - Not set to continue test
                Set to continue test

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SPECIFICATION SYMBOL
SB-10163

```
   ( TF14 )                          (A)

  ┌──────────────┐              ┌──────────────┐
  │ Store func-  │              │ Enter AU     │
  │ tion code    │              │ with         │
  │ in display   │              │ correct      │
  │ cells        │              │              │
  └──────────────┘              └──────────────┘
         │                             │
  ┌──────────────┐              ╱──────────────╲
  │ Enter AL     │              │   TFDIS       │
  │ with pat-    │              ├───────────────┤
  │ tern         │              │   Error       │
  │ (525252)     │              │   display     │
  └──────────────┘              ╲──────────────╱
         │                             │
  ┌──────────────┐                    (B)
  │ ADD AL +     │
  │ 252525       │
  └──────────────┘
         │
    ╱ AL ZERO ╲──No──(A)
    ╲         ╱
         │Yes
  ┌──────────────┐
  │ ENT B =      │
  │ 377777       │
  └──────────────┘
         │
        (○)◄──────────┐
         │            │
    ╱ B = 0 ╲──Yes──╱ AL=377777 ╲──No──(A)
    ╲       ╱       ╲            ╱
         │No              │Yes
  ┌──────────────┐       (B)
  │ ADD AL +     │        │
  │ 000001       │    ( Exit )
  └──────────────┘
```

TF14:   ADD AL+Y   14xxxx,
                         Y

SPECIFICATION SYMBOL
SB-10163

TITLE: TF15 - ADD A LOWER PLUS (Y÷B) (15xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF15   KEY: _____   IS LABEL DUPLICATE? No

PROGRAMMER: F W S modified by TLR   DATE: 8 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 26

DESCRIPTION:

This subroutine checks the Add A Lower plus (Y÷B) command. A constant is entered into B and AL, then the ADDALB command is executed, using a test-pattern constant (Y+B) of the same value as B. AU is then entered with the correct information from a test pattern, followed by a compare of AL to that same test pattern to check the validity of the ADDALB command. If the result is correct, the next constant is entered into B and AL. This cycle is repeated until AL is equal to 000010. At this point the subroutine returns to the Executive routine (COMA). If the validity check detects an error an exit is made to the display subroutine where, with PROGRAM STOP 0 set, AU will contain the correct information, AL the incorrect information, the function code will be displayed in CO, and the error may be evaluated. Upon returning to this subroutine (TF15) an exit is made to the Executive routine (COMA) to check for continuing the test or recycling this subroutine.

SPECIFICATION SYMBOL
SB-10163

TITLE: TF15

INPUT PARAMETERS (Listed Sequentially):

COMA   TEST PATTERNS

TPAB1   000001
TPAS4   000002
TPAS5   000004
TPAS   0C0010

OUTPUT PARAMETERS (Listed Sequentially):

BUFF 1
BUFF 2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA - (COMA)
TFDIS - Error Display
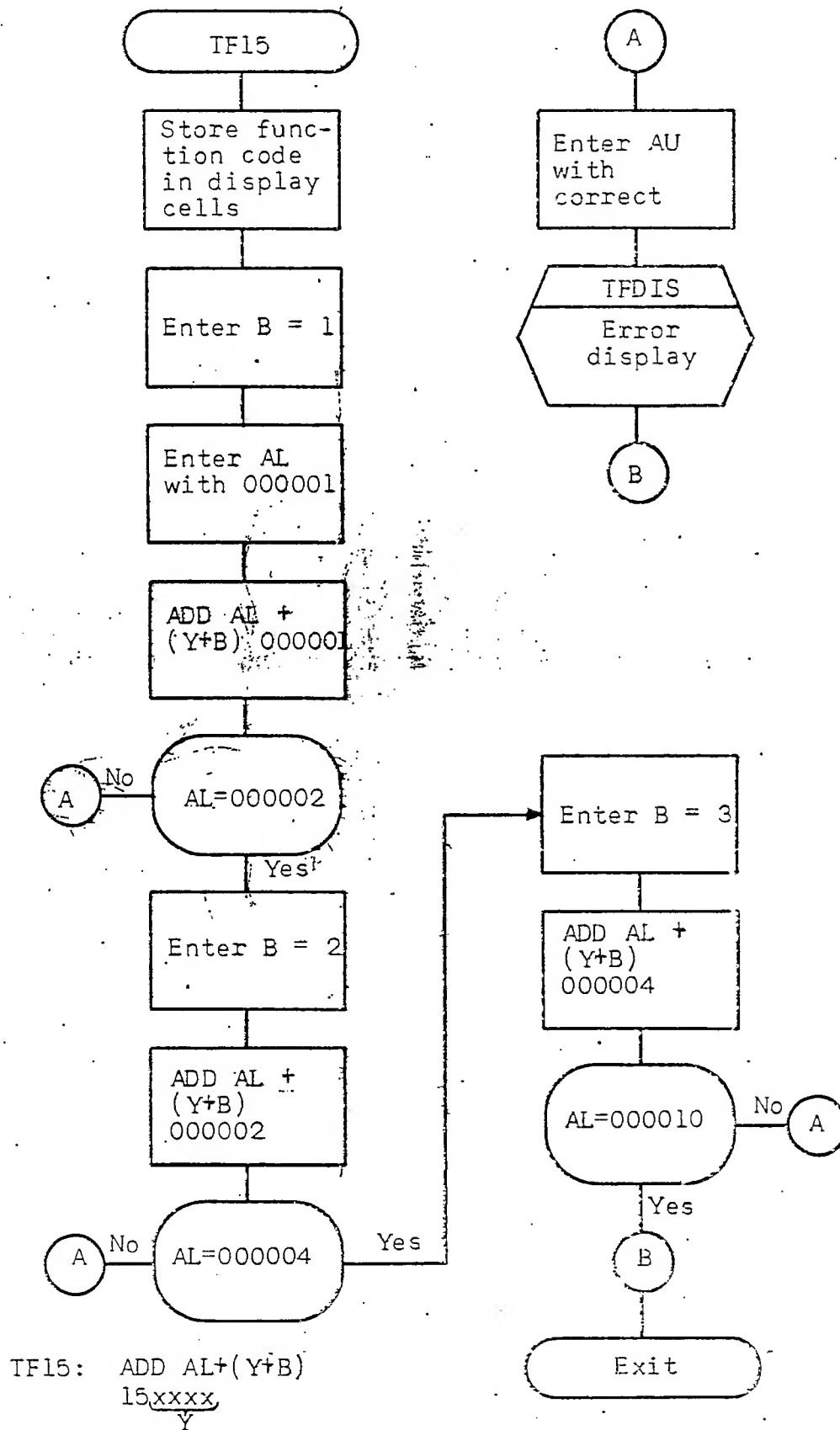
SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY
PROGRAM STOP O - Incorrect information in A Lower
                 Correct information in A Upper
                 Function code (15xxxx) in CO
PROGRAM SKIP 4 - Set for console error display only
                 Not set for error typeout (Function Code 15)
PROGRAM SKIP O - Not set to continue test
                 Set to recycle subroutine (TF15)

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TF15: ADD AL+(Y+B)
15xxxx
Y

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PROGRAM DATA PAGE

SPECIFICATION SYMBOL
SB-10163

TITLE: TF16 - SUBT A LOWER MINUS Y (16xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF16 KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: F W S modified by ILR DATE: 8 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 28

DESCRIPTION:

This subroutine checks the Subtract A Lower Minus Y command. A constant is entered into AL, and a test-pattern constant into AU (the correct information). Then the subtract A lower minus Y (Y is another test pattern) is executed. If A is equal to zero, another SUBAL command is executed and compared to another constant. If the validity check detects no error, another test-pattern constant is entered into AL and the sequence is repeated until the comparison shows that AL and the test pattern are equal to 700000. The subroutine then returns to the Executive routine (COMA). If an error is detected at any point in the subroutine, AU will contain the correct information, AL the incorrect information, and an exit will be made to the display subroutine. If PROGRAM STOP Q is set, the function code will be displayed in CO and the error may be evaluated. Upon returning to this subroutine (TF16) an exit is made to the executive routine (COMA) to check for continuing the test or recycling the subroutine.

SPECIFICATION SYMBOL
SB-10163

TITLE: TF16

INPUT PARAMETERS (Listed Sequentially):

TEST PATTERNS

TPAT1	000000
TPAB1	000001
TPAB4+1	277777
TCO	777776
TCO1+1	177777
TCO4+1	200000
TCUT4	700000

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1
BUFF2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA - (EXEC)
TFDIS - Error Display

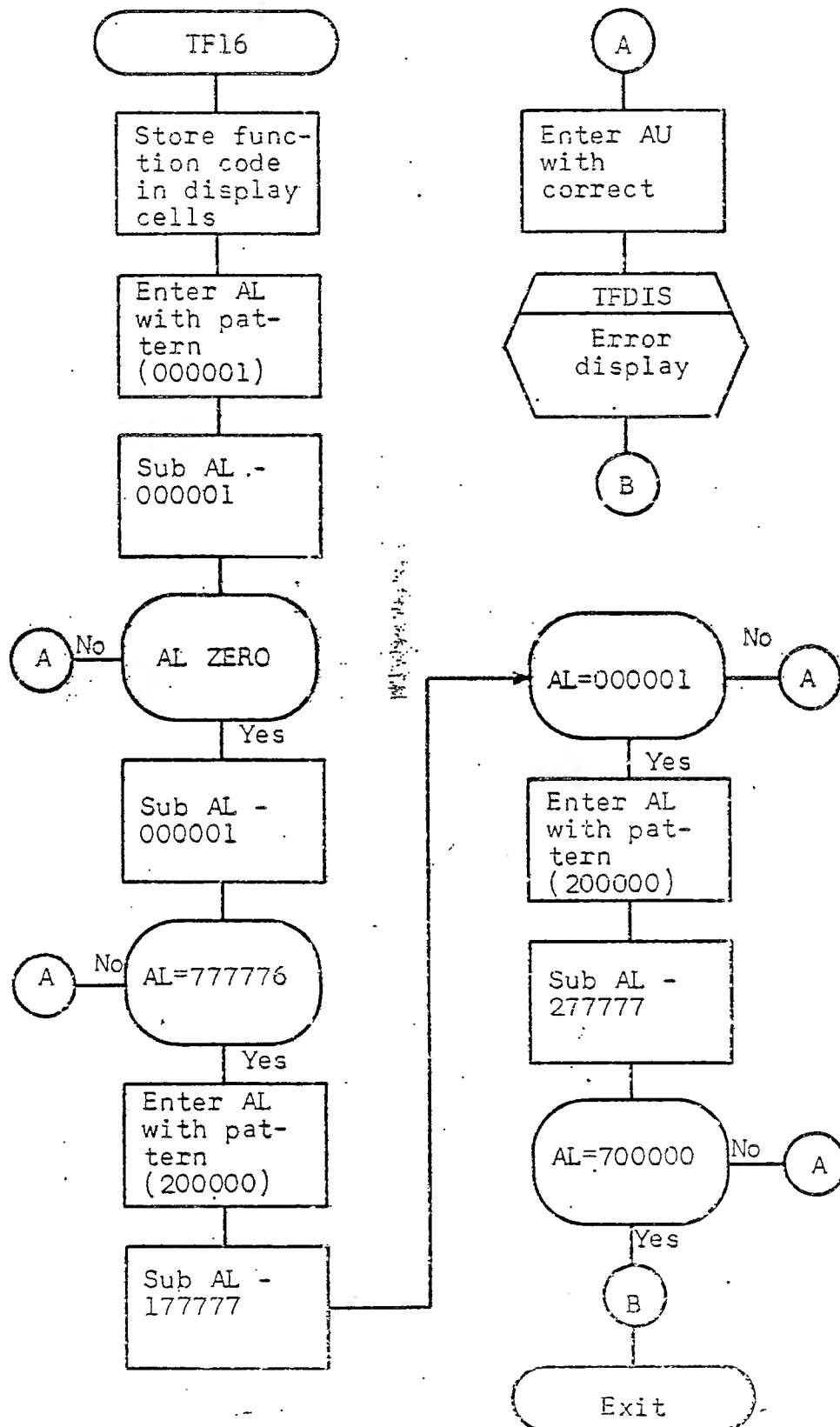SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:
ERROR DISPLAY
PROGRAM STOP 0 - Incorrect information in A Lower
                 Correct information in A Upper.
                 Function code (16xxxx) in CO
PROGRAM SKIP 4 - Set for console error display only
                 Not set for error typeout (Function Code 16)
PROGRAM SKIP 0 - Not set to continue test
                 Set to recycle subroutine (TF16)

SPECIFICATION SYMBOL
SB-10163

TF16

Store function code in display cells

Enter AL with pattern (000001)

Sub AL.- 000001

AL ZERO — No → A

Yes

Sub AL - 000001

AL=777776 — No → A

Yes

Enter AL with pattern (200000)

Sub AL - 177777

A

Enter AU with correct

TFDIS
Error display

B

AL=000001 — No → A

Yes

Enter AL with pattern (200000)

Sub AL - 277777

AL=700000 — No → A

Yes

B

Exit

TF16:   SUBT AL-Y   16xxxx
                                    Y

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SPECIFICATION SYMBOL
SB-10163

TITLE: TF17 - SUBTRACT AL MINUS (Y+B) (17xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF17   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: F W S modified by TLR   DATE: 8 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 21

DESCRIPTION:

This subroutine checks the Subtract A Lower Minus (Y+B) command.
Constants are entered into AL, B and AU (AU being the correct
information as the result of the command). Then the SUBALB command
is executed and validity is checked if AL is equal to zero. AL
and B are entered with two different constants. Another Subtract
AL minus (Y+B) command is executed and AU is entered with the
correct information from a test-pattern constant. A compare is
executed between AL and the correct information of a test pattern
constant for validity. If correct, an exit is made to the execu-
tive routine (COMA) to continue the program. If an error is detected
by the validity checks, an exit is made to the display subroutine.
AU will contain the correct information, AL the incorrect infor-
mation, and if PROGRAM STOP 0 is set, CO will contain the func-
tion code, and the error may be evaluated. Upon return to this
subroutine (TF17) an exit is made to the executive routine (COMA)
to check for continuing the test or recycling this subroutine (TF17).

SPECIFICATION SYMBOL
SB-10163

TITLE: TF17

INPUT PARAMETERS (Listed Sequentially):

COMA

TEST PATTERNS

TPAT1	000000
TPAB2	200001
TPAB1-11	000001
TCO	777776
TCO4+1	200000

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1
BUFF2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA (EXEC)
TFDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY
PROGRAM STOP 0 - Correct information in A Upper
                 Incorrect information in A Lower
                 Function code (17xxxx) in CO
PROGRAM SKIP 4 - Set for console error display only
                 Not set for error typeout (Function Code 17)
PROGRAM SKIP 0 - Not set to continue test
                 Set to recycle subroutine
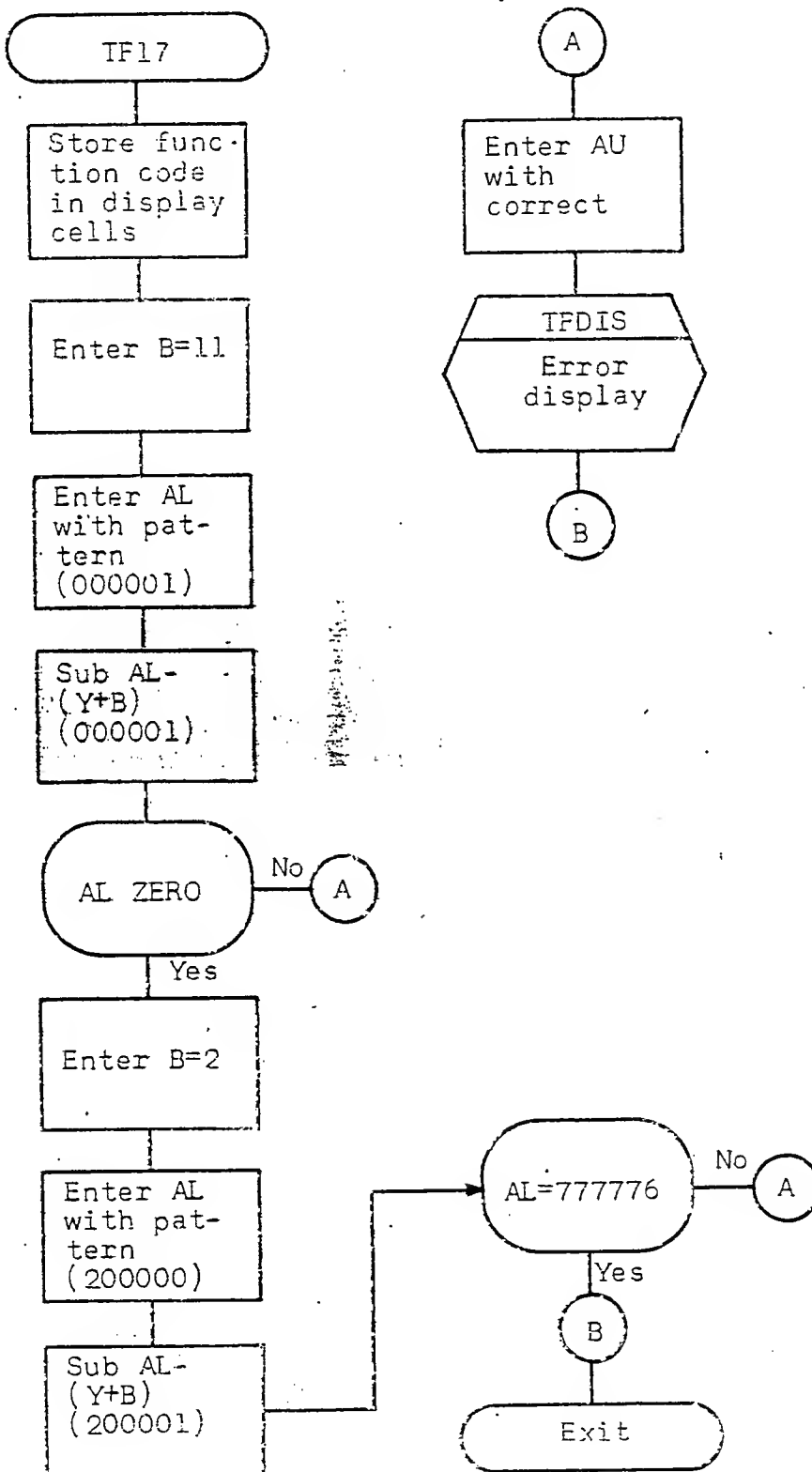
TF17

Store function code in display cells

Enter B=11

Enter AL with pattern (000001)

Sub AL-(Y+B) (000001)

AL ZERO — No → A

Yes

Enter B=2

Enter AL with pattern (200000)

Sub AL-(Y+B) (200001)

A

Enter AU with correct

TFDIS
Error display

B

AL=777776 — No → A

Yes

B

Exit

TF17; SUBT AL-(Y+B) $17\underline{xxxx}$
                                    $\overline{Y}$

SPECIFICATION SYMBOL
SB-10163

TITLE: TF20 - ADD A PLUS (Y) AND (Y+1) (20xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF20   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: F W S modified by TLR   DATE: 8 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 31

DESCRIPTION:

This subroutine checks the Add A Plus (Y) and (Y+1) command. AU
and AL are entered with a test pattern, and an Add A plus Y (Y being
another, test-pattern constant) is executed. The execution is
checked by jumping and entering the next sequential, test-pattern
constant into AU if A is equal to zero. ADDA is again executed,
and validity checked by a compare of A to the image, test-pattern
constant. Then an exchange of registers is accomplished by left
shifting A and comparing AL to the respective pattern and thereby
checking for validity of the AU bits. By left shifting A again,
the bits are replaced in their original positions and another Add
A command is executed and the results in AL are compared to a test
pattern. If correct, another left shifting and compare sequence
is performed. If correct, an exit is made to the executive routine
(COMA) to continue the program. If an error is detected by any of
the validity checks, an exit is made to the error display subroutine
with the sum of the ADD in AU and AL. With PROGRAM STOP 0 set, CO
will contain the function code and the error may be evaluated.
Upon return to this subroutine (TF20) an exit is made to the execu-
tive routine (COMA) to check for continuing the test or recycling
this subroutine (TF20).

SPECIFICATION SYMBOL
SB-10163

TITLE: TF20

INPUT PARAMETERS (Listed Sequentially):

COMA

TEST PATTERNS

TPAT1	000000	000000
TCO	777777	777776
TCO+1		777777
TCO1	177777	777777
TCO1+1	177777	
TCO3	377777	
TCO4+1	200000	

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1
BUFF2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):
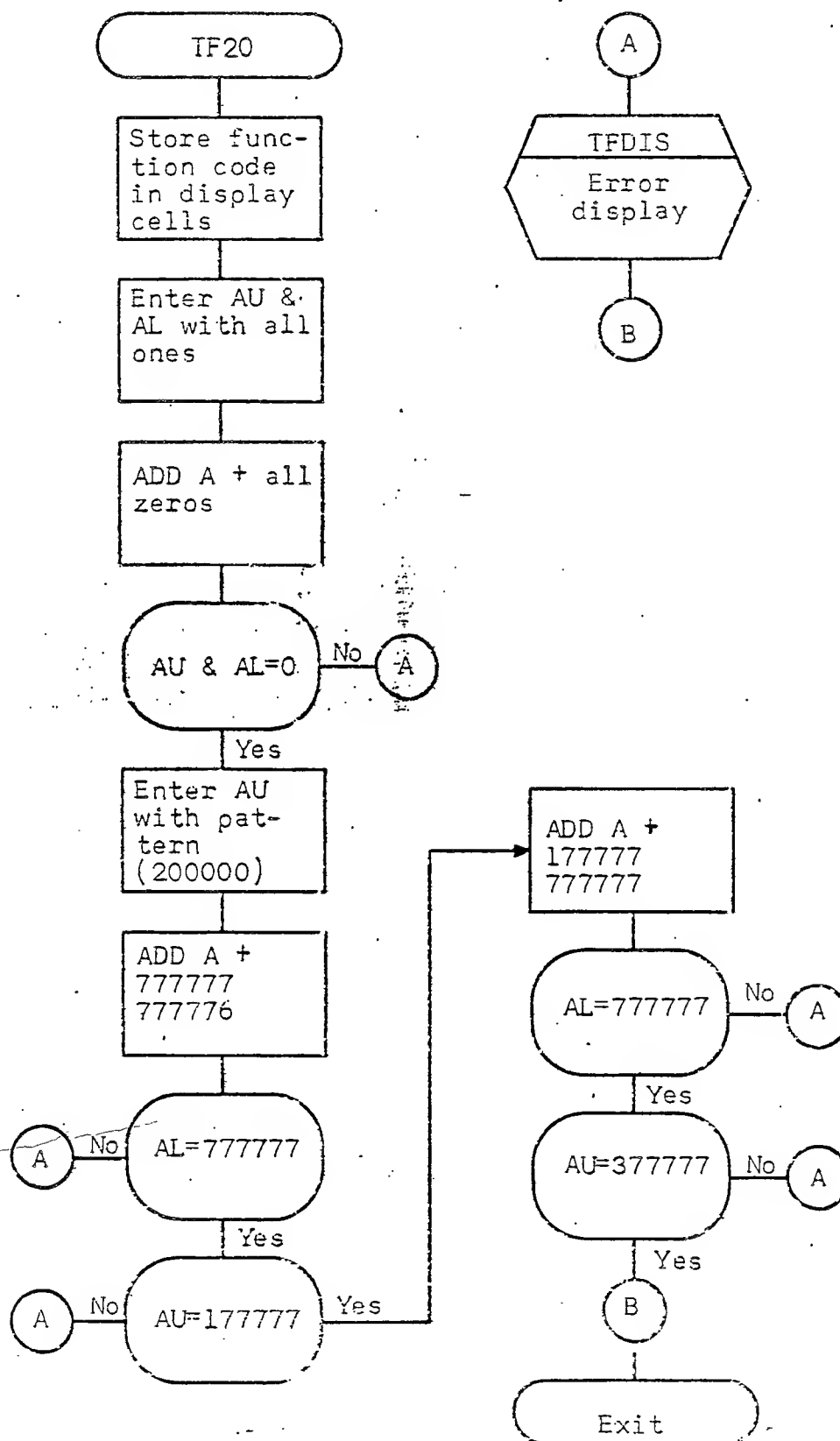
COMA - (EXEC)
TFDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY
PROGRAM STOP 0 - AU and AL = sum of Add
                 CO = function code (20xxxx)
PROGRAM SKIP 4 - Set for console error display only
                 Not set for error typeout (Function Code 20)
PROGRAM SKIP 0 - Not set to continue test
                 Set to recycle subroutine (TF20)

SPECIFICATION SYMBOL
SB-10163

```
        ( TF20 )                              ( A )

   ┌──────────────┐                       ┌─────────────┐
   │ Store func-  │                       │    TFDIS    │
   │ tion code    │                       │    Error    │
   │ in display   │                       │   display   │
   │ cells        │                       └─────────────┘
   └──────────────┘                             │
                                             ( B )
   ┌──────────────┐
   │ Enter AU &   │
   │ AL with all  │
   │ ones         │
   └──────────────┘

   ┌──────────────┐
   │ ADD A + all  │
   │ zeros        │
   └──────────────┘

   ( AU & AL=0 )──No──( A )
          │
         Yes

   ┌──────────────┐                    ┌─────────────┐
   │ Enter AU     │                    │   ADD A +   │
   │ with pat-    │                    │   177777    │
   │ tern         │                    │   777777    │
   │ (200000)     │                    └─────────────┘
   └──────────────┘
                                       ( AL=777777 )──No──( A )
   ┌──────────────┐                          │
   │ ADD A +      │                         Yes
   │ 777777       │
   │ 777776       │                    ( AU=377777 )──No──( A )
   └──────────────┘                          │
                                            Yes
( A )──No──( AL=777777 )
                │                          ( B )
               Yes

( A )──No──( AU=177777 )──Yes──

                                        ( Exit )
```

TF20:   ADD A∓(Y)&(Y+1)   20xxxxx

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SPECIFICATION SYMBOL
SB-10163

TITLE: TF21 - ADD A PLUS (Y+B) (Y+B+1) (21xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF21   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: F W S modified by TLR   DATE: 8 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 27

DESCRIPTION:

This subroutine checks the Add A Plus (Y+B) (Y+1+B) command. AU
and AL are entered with a test-pattern constant, B is entered with
a constant, and an ADDAB command is executed. Validity is checked
if A is equal to zero and another constant is entered into AU and B.
Another ADDAB command is executed, and if a borrow is generated, AL
is compared to the proper test pattern. If no borrow is generated,
an Add A to Y command is executed and AL is compared to the above
test pattern. If correct, a left shift A command is executed and
AL is compared to a test pattern as a validity check for AU bits.
If correct, an exit is made to the executive routine (COMA) to
continue the program. If an error is detected by any of the validity
checks, an exit is made to the error display subroutine. With PRO-
GRAM STOP O set, AU and AL will contain the sum of the Add A command,
CO will contain the function code, and the error may be evaluated.
Upon return to this subroutine (TF21) an exit is made to the execu-
tive routine (COMA) to check for continuing the test or recycling
this subroutine (TF21)

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SPECIFICATION SYMBOL
SB-10163

TITLE: TF21

INPUT PARAMETERS (Listed Sequentially):

CCMA   TEST PATTERNS

TPAT1-1	000000	000000
TCO	777777	777776
TCO+1	777777	
TCO1-4	177777	777777
TCO3	377777	
TCO4+1	200000	

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1
BUFF2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

CCMA - (EXEC)
TFDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:
ERROR DISPLAY
PROGRAM STOP 0 - AU and AL = sum of Add A ... - ...
                 CO = function code (21xxxx)
PROGRAM SKIP 4 - Set for console error display only
                 Not set for error typeout (Function Code 21)
PROGRAM SKIP 0 - Not set to continue test
                 Set to recycle subroutine (TF21)

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SPECIFICATION SHEET

| SHEET | 234 | REVISION | — |

SPECIFICATION SYMBOL
SB-10163

(TF21)

Store function code in display cells

Enter B =11

Enter AU & AL with all ones

ADD A + all zeros

(A) ← No — AU = 0 — Yes ↓

(A) ← No — AL = 0 — Yes ↓

Enter B = 4

Enter AU with pattern (200000)

(A)

⬡ TFDIS
Error display ⬡ — (B)

ADD A +
(177777
777777)

Borrow exist — No
↓ Yes

ADD A +
777777
777776

○

AL=777777 — No — (A)
↓ Yes

AL=377777 — No — (A)
↓ Yes

(B)

(Exit)

TF21:   ADD A+(Y+B)(Y+B+1)   21xxxx

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PROGRAM DATA PAGE

SPECIFICATION SYMBOL
SB-10163

TITLE: ___TF22 - SUBTRACT A MINUS (Y) (22xxxx)___

DECK IDENTIFIER: __FACT__

CS-1 LABEL: ___TF22___   KEY: _____ IS LABEL DUPLICATE? ___No___

PROGRAMMER: __F W S modified by TLR__   DATE: ___8 Dec. 67___

NUMBER OF L_4 OUTPUT INSTRUCTIONS: ___31___

DESCRIPTION:

This subroutine checks the Subtract A Minus (Y) command. Test
patterns are entered into AU and AL, and a SUBA command is executed.
The validity of the result is checked by jumping to another enter
AU, AL, and Subtract A commands sequence. Then left shift A and
compare commands are executed to check validity of the bits that
were in AU. If no error is detected the next pattern is entered
into AU and AL, and this cycle is repeated. If correct, an exit is
made to the executive routine (COMA) to continue the program. If
an error is detected, the remainder of the subtract will be con-
tained in AU and AL. An exit is then made to the display subroutine
where with PROGRAM STOP O set, CO will contain the function code
and the error may be evaluated. Upon return to this subroutine
(TF22) an exit is made to the executive routine (COMA) to check for
continuing the test or recycling this subroutine.

SPECIFICATION SYMBOL
SB-10163

TITLE: TF22

INPUT PARAMETERS (Listed Sequentially):

COMA   TEST PATTERNS

TPAT	777777	
TCO1	177777	777777
TCO1+1	177777	
TCO4	200000	000000
TCO4+1	200000	
TPAB1	000001	

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1
BUFF2
TFX

ABNORMAL EXITS (Listed Sequentially):

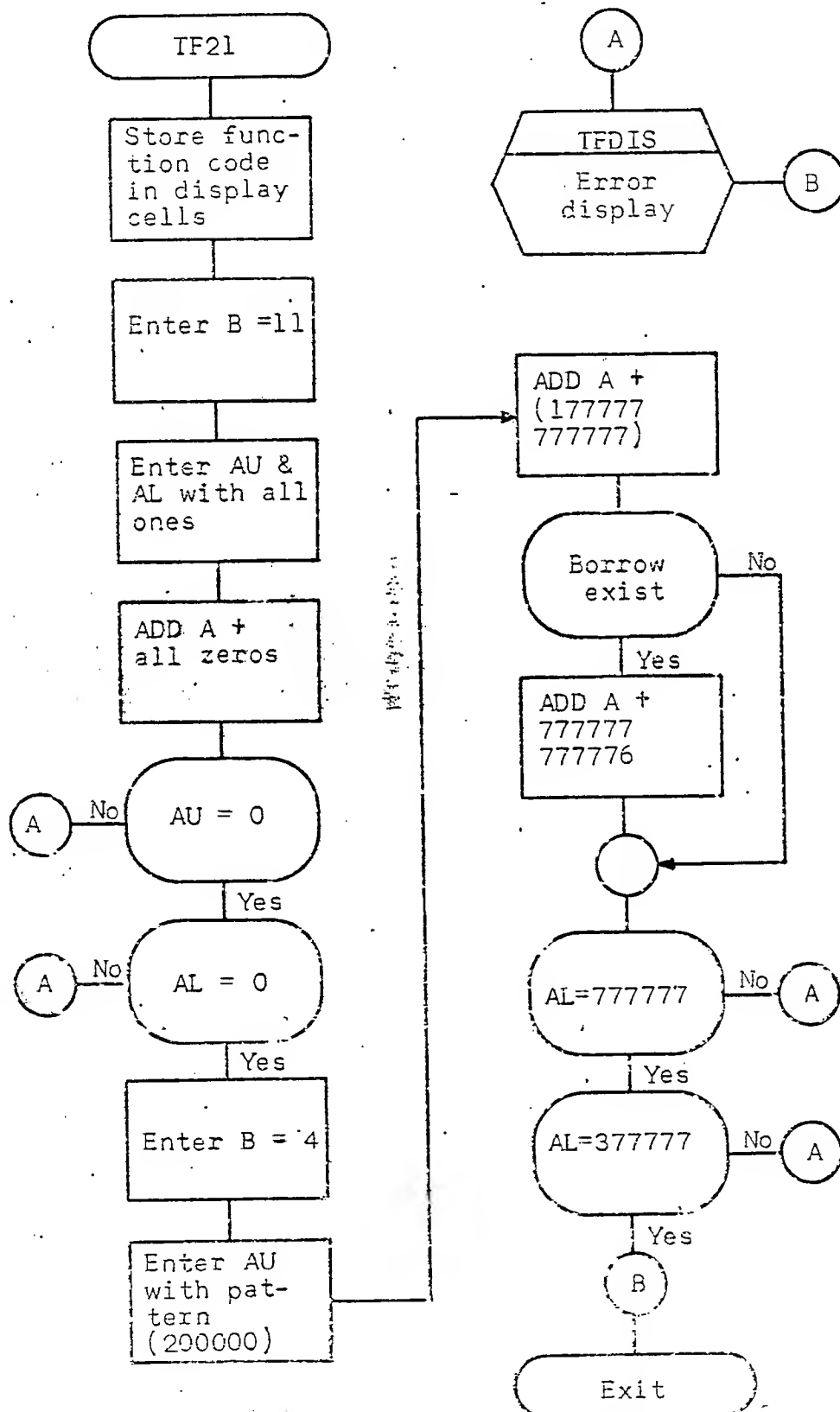NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA - (EXEC)
TFDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY
PROGRAM STOP 0 - AU and AL = remainder
                CO = function code (22xxxx)
PROGRAM SKIP 4 - Set for console error display only
                Not set for error typeout (Function Code 22)
PROGRAM SKIP 0 - Not set to continue test
                Set to recycle subroutine (TF22)

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SPECIFICATION SHEET

Left column:

(TF22)

→ Store function code in display cells

→ Enter AL with pattern (777777)

→ Enter AU with pattern (177777)

→ SUBT A-(Y) 177777 777777

→ AL ZERO — No → (A)

↓ Yes

AU ZERO — No → (A)

↓ Yes

Enter AL with pattern (777777)

→ Enter AU with pattern (200000)

→ (B)

Right column:

(B)

→ Subt A - (Y) 177777 777777

→ AU=000001 — No → (A)

↓ Yes

AL ZERO — No → (A)

↓ Yes

Enter AL with pattern (777777)

→ Enter AU with pattern (177777)

→ Subt A-(Y) 200000 000000

→ AL=777777 — No → (A)

↓ Yes

AU=777777 — No → (A)

↓ Yes

(C)

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SPECIFICATION SHEET

SHEET	238	REVISION —

SPECIFICATION SYMBOL
SB-10163

TF22:   SUBT A-(Y)   22xxxx

SHEET 239	REVISION —

SPECIFICATION SYMBOL
SB-10163

TITLE: TF 23 - SUBTRACT A MINUS Y+B AND Y+1+B (23xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF23   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: F W S modified by TLR   DATE: 8 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 25

DESCRIPTION:

This subroutine checks the Subtract A Minus Y+B and Y+1+B command,
AL, AU, and B are entered with constants and a SUBAB command is
executed; validity is checked if A is equal to zero. The above is
repeated with different constants and AL is compared to a constant
for validity and then checked for a borrow. If correct, an exit
is made to the executive routine (COMA) to continue the program.
If an error is detected by any of the validity checks, an exit is
made to the display subroutine. AU and AL will contain the remainder
of the subtract and, if PROGRAM STOP O is set, CO will display the
function code and the error may be evaluated. Upon return to this
subroutine (TF23) an exit is made to the executive routine (COMA)
to check for continuing the test or recycling this subroutine.

A-1974

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PROGRAM DATA PAGE (Cont)

SPECIFICATION SYMBOL
SB-10163

TITLE: TF23

INPUT PARAMETERS (Listed Sequentially):

COMA

TEST PATTERNS

TPAT	777777	
TPAT1	000000	
TPAB1	000001	
TCO+1	177777	
TCO1-11	177777	777777
TCO4+1	200000	
TCO1-32	177777	777777

OUTPUT PARAMETERS (Listed Sequentially):

BUFF 1
BUFF 2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA - (EXEC)
TFDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY
PROGRAM STOP 0 - AU and AL = remainder
                CO = function code (23xxxx)
PROGRAM SKIP 4 - Set for console error display only
                Not set for error typeout (Function Code 23)
PROGRAM SKIP 0 - Not set to continue test
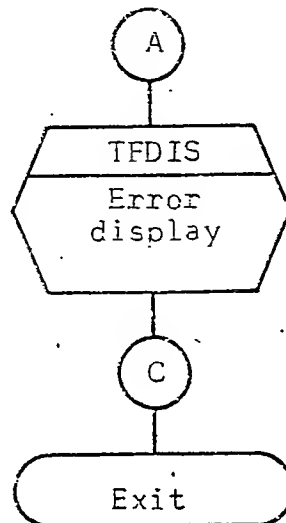   Set to recycle subroutine (TF23)

A-1975

SPECIFICATION SYMBOL
SB-10163

TF23

Store function code in display cells

Enter AL with pattern (777777)

Enter AU with pattern (177777)

Enter B=11

Subt A-(Y+B)
177777
777777

AL ZERO — No → A

Yes

AU ZERO — No → A

Yes

Clear AL

B

A

TFDIS
Error display — C

B

Enter AU with pattern (200000)

Enter B=32

Subt A-(Y+B)
177777
777777

AL=000001 — No → A

Yes

AU ZERO — No → A

Yes

C

Exit

TF23:   SUBT A-(Y+B)   23xxxxx

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PROGRAM DATA PAGE

SPECIFICATION SHEET

SHEET 242 | REVISION ——

SPECIFICATION SYMBOL
SB-10163

TITLE: TF24 MULTIPLY A LOWER BY Y (24xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF 24   KEY: _____ IS LABEL DUPLICATE? _____

PROGRAMMER: F W S modified by TLR   DATE: 8 Dec. 67

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 33

DESCRIPTION:

This subroutine checks the Multiply AL by Y command. AL is entered
with a constant and a MULAL by a test-pattern constant command is
executed. A validity check is made by jumping if A is equal to
zero, and entering a different constant into AL. Another 24 command
is executed and validity again checked. Then a MULAL command is
executed and validity is checked by comparing the result in AL to
a test-pattern constant. AU is checked by left shifting AU into AL
and doing another compare of AL to a different test pattern. If
correct the above cycle (with shifting) is repeated with a different
test pattern and if correct, an exit is made to the executive
routine (COMA) to continue the program. If an error is detected
by any of the validity checks an exit is made to the display sub-
routine. AU and AL will contain the product of the multiply and,
with PROGRAM STOP 0 set, CO will display the function code and the
error may be evaluated. Upon return to this subroutine (TF24) an
exit is made to the executive routine (COMA) to check for continu-
ing the test or recycling the subroutine.

TITLE: TF24

INPUT PARAMETERS (Listed Sequentially):

COMA   TEST PATTERNS

TPAT3	525252
TPAB1	000001
TCO1+1	177777
TCO3	377777
TCUT5	343434
TCUT6	113663
TCUT7	664114

OUTPUT PARAMETERS (Listed Sequentially):

BUFF 1
BUFF 2
TFX

ABNORMAL EXITS (Listed Sequentially):

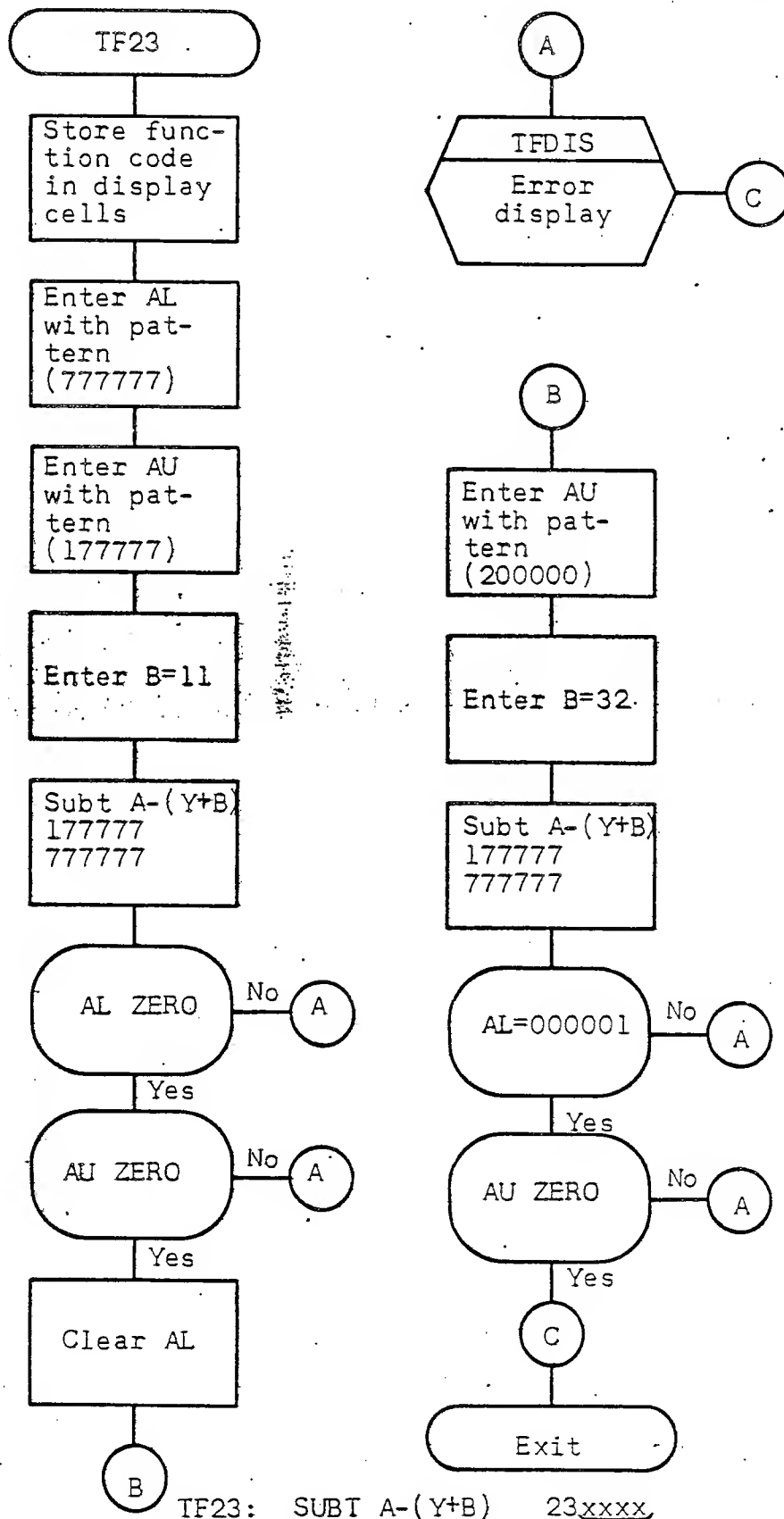NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA - (EXEC)
TFDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:
ERROR DISPLAY
PROGRAM STOP 0 - AU and AL = product
                CO = function code (24xxxx)
PROGRAM SKIP 4 - Set for console error display only
                Not set for error typeout (Function Code 24)
PROGRAM SKIP 0 - Not set to continue test
                Set to recycle subroutine (TF24)

TF24

Store function code in display cells

Clear AL

MULT AL X. 377777

AL = 0 — No → A

Yes

Enter AL with 000001

MULT AL X 377777

AL=377777 — No → A

Yes

AU = 0 — No → A

Yes

B

B

Enter AL with pattern (377777)

MULT AL X 377777

AL=000001 — No → A

Yes

AU = 177777 — No → A

Yes

Enter AL with pattern (525252)

MULT AL X 343434

AL=113663 — No → A

Yes

AU=664114 — No → A

Yes

C

TFDIS

Error
display

A

C

Exit

TF24

TF24: MULTIPLY AL BY Y

$\dfrac{24xxxx}{Y}$

SPECIFICATION SYMBOL
SB-10163

TITLE: TF25 - MULTIPLY A LOWER BY Y PLUS B (25xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF25   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: F W S modified by TLR   DATE: 8 Dec. 67

NUMBER OF L$_4$ OUTPUT INSTRUCTIONS: 31

DESCRIPTION:

This subroutine checks the Multiply A Lower By Y Plus B command.
Constants are entered into AL and B and a MULALB command is execu-
ted using a test-pattern constant. Validity is checked by entering
another test pattern into AL and a constant into B if A is equal
to zero. Then another 25 command is executed, and AL validity is
checked. If AL is equal to zero, A is left shifted and a compare of
AL with a test pattern is executed to check the validity of AU.
If no error is detected, the above cycle (with the left shift) is
repeated with different constants. If no error is detected by any
of the validity checks, an exit is made to the executive routine
(COMA) to continue the program. If an error is detected an exit
is made to the display subroutine. AL and AU will contain the
product of the multiply and, with PROGRAM STOP 0 set, CO will con-
tain the function code and the error may be evaluated. Upon return
to this subroutine (TF25) an exit is made to the executive routine
(COMA) to check for continuing the test or recycling the subroutine.

SPECIFICATION SYMBOL
SB-10163

TITLE: TF25

INPUT PARAMETERS (Listed Sequentially):

COMA   TEST PATTERNS

                            TPAB5+1   677777
                            TCO2   010000
                            TCO4   000000

OUTPUT PARAMETERS (Listed Sequentially):

BUFF 1
BUFF 2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):
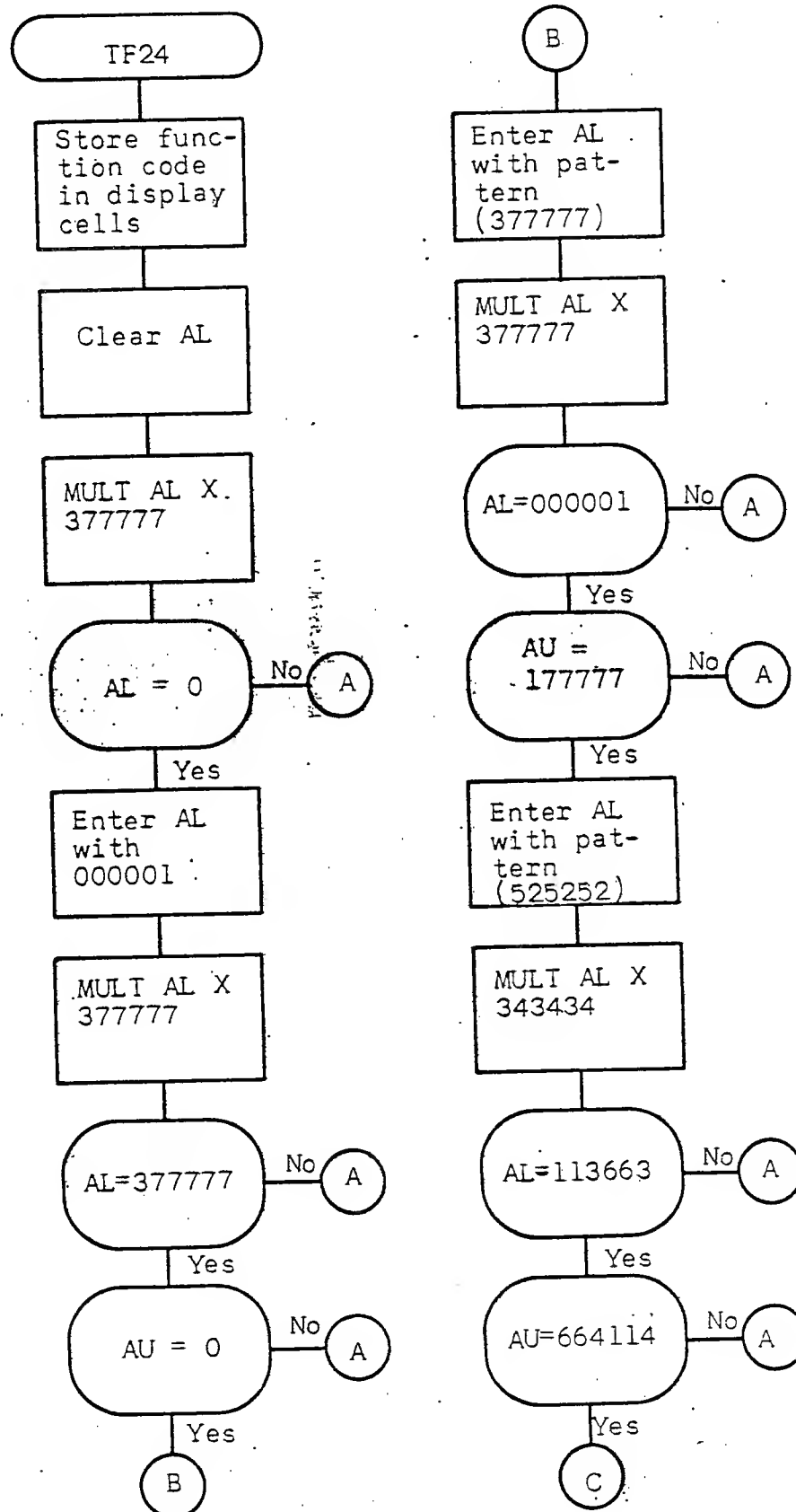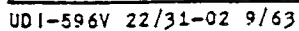
COMA - (EXEC)
TFDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY
PROGRAM STOP 0 - AU and AL = product
                 CO = function code (25xxxx)
PROGRAM SKIP 4 - Set for console error display only
                 Not set for error typeout (Function Code 25)
PROGRAM SKIP 0 - Not set to continue test
                 Set to recycle subroutine (TF25)
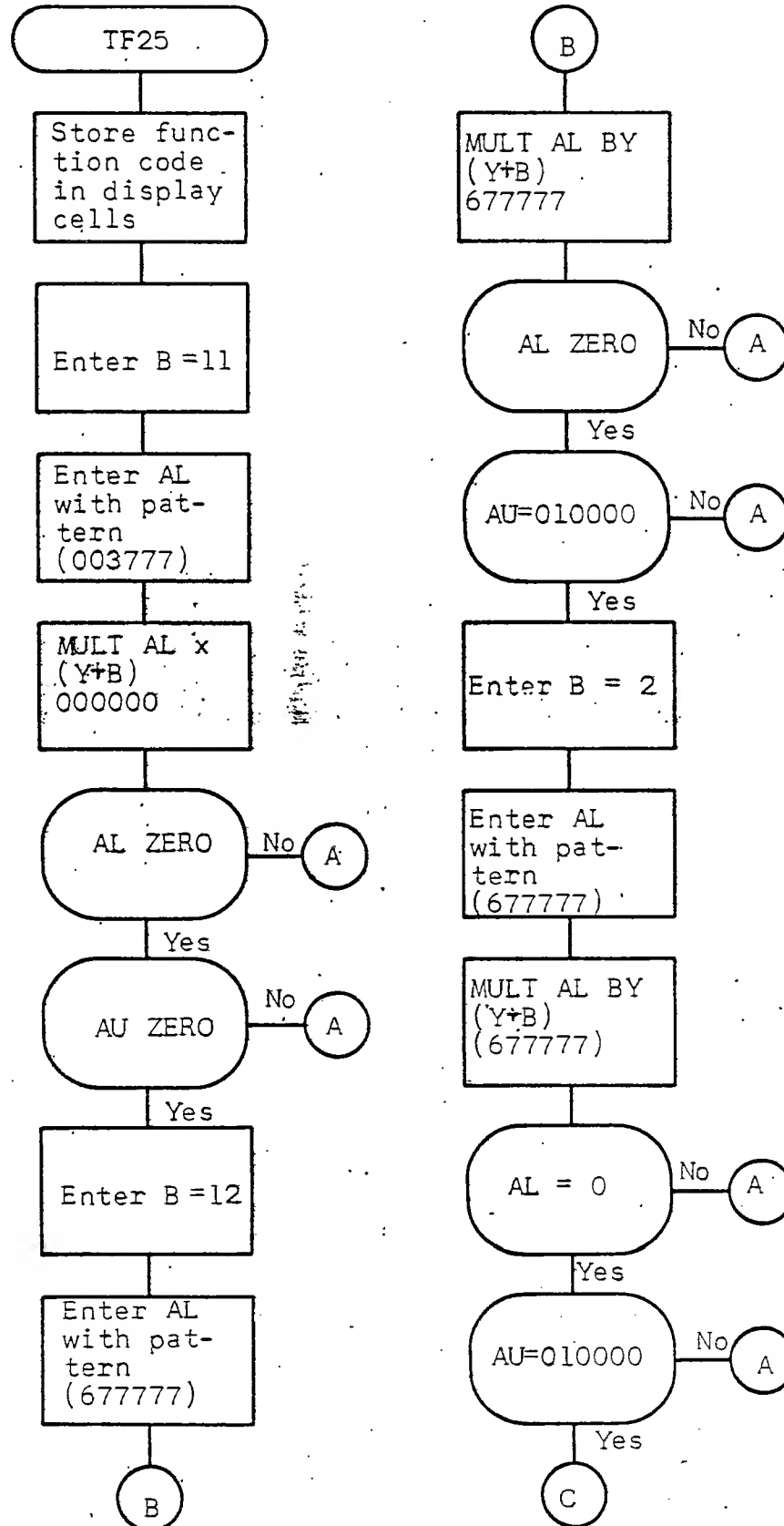
A-1975

Left column:

(TF25)

```
Store func-
tion code
in display
cells
```

```
Enter B = 11
```

```
Enter AL
with pat-
tern
(003777)
```

```
MULT AL x
(Y+B)
000000
```

AL ZERO —No→ (A)

Yes

AU ZERO —No→ (A)

Yes

```
Enter B = 12
```

```
Enter AL
with pat-
tern
(677777)
```

(B)

Right column:

(B)

```
MULT AL BY
(Y+B)
677777
```

AL ZERO —No→ (A)

Yes

AU = 010000 —No→ (A)

Yes

```
Enter B = 2
```

```
Enter AL
with pat-
tern
(677777)
```

```
MULT AL BY
(Y+B)
(677777)
```

AL = 0 —No→ (A)

Yes

AU = 010000 —No→ (A)

Yes

(C)

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PROGRAM DATA PAGE

SPECIFICATION SYMBOL
SB-10163

TITLE: TF26 - DIVIDE A BY Y (26xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF26   KEY: IS LABEL DUPLICATE? No

PROGRAMMER: EWS modified by ILR   DATE: 8 Dec. 67.

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 41

DESCRIPTION:

This subroutine checks the Divide A By Y command. AU and AL are
entered with test-pattern constants and a DIVA command is executed
using another test-pattern constant. A validity check is executed
by comparing AL to a test-pattern constant. If correct, A is left
shifted and another comparing of AL to check AU is executed. If
correct, AU is entered with a different, test-pattern constant and
another 26 command is executed, AL is checked for validity by another
comparison. AU validity is checked by entering AL and AU if A is
equal to zero. A DIVA command is then executed and validity is
checked the same as the first time. This is repeated one more time
with different test patterns, and if no error is detected, an exit
is made to the executive routine (COMA) to continue the program.
If an error is detected by any of the validity checks, an exit is
made to the display subroutine. AU will contain the remainder and
AL the quotient, and if PROGRAM STOP 0 is set, CO will display the
function code and the error may be evaluated. Upon return to this
subroutine (TF26) an exit is made to the executive routine (COMA)
to check for continuing the test or recycling the subroutine (TF26).

	SPECIFICATION SYMBOL
	SB-10163

TITLE: TF26

INPUT PARAMETERS (Listed Sequentially):

COMA

TEST PATTERNS

TPAT	777777	TCUT	500000
TPAT1	000000	TCUT1	477777
TPAB+1	300000	TCUT2	670000
TPAB4	107777	TCUT3	077777
TPAB4+1	277777		
TPAS4	000002		
TCO	777776		
TCO4+1	200000		

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1
BUFF2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA (EXEC)
TFDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY
PROGRAM STOP 0 - Remainder in AU
                 Quotient in AL
                 Function code (26xxxx) in CO
PROGRAM SKIP 4 - Set for console error display only
                 Not set for error typeout (Function Code 26)
PROGRAM SKIP 0 - Not set to continue test
                 Set to recycle subroutine (TF26)

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SPECIFICATION SYMBOL
SB-10163

(TF26)

Store function code in display cells

Enter AU with pattern (107777)

Enter AL with pattern (777777)

DIV A by (Y) 300000

AL = 277777 — No → (A)

Yes

AU = 277777 — No → (A)

Yes

Clear AU

DIV A by (Y) 500000

(A)

TFDIS
Error display

(C)

Exit

AL = 777776 — No → (A)

Yes

AU ZERO — No → (A)

Yes

(B)

SPECIFICATION SYMBOL
SB-10163

```
                    ( B )
                      |
            +------------------+
            | Enter AL         |
            | with pat-        |
            | tern             |
            | (477777)         |
            +------------------+
                      |
            +------------------+
            |                  |
            |   Clear AU       |
            |                  |
            +------------------+
                      |
            +------------------+
            | DIV A by         |
            | (Y)              |
            | 200000           |
            +------------------+
                      |
            (  AL=000002  )---No---( A )
                      |
                    Yes
                      |
            (  AU=077777  )---No---( A )
                      |
                    Yes
                      |
            +------------------+
            | Enter AU         |
            | with pat-.       |
            | tern             |
            | (670000)         |
            +------------------+
                      |
            +------------------+
            |                  |                (  AL=277777  )---No---( A )
            |   Clear AL       |                       |
            |                  |                      Yes
            +------------------+                       |
                      |                       (  AL=500000  )---No---( A )
            +------------------+                       |
            | DIV A by         |---------------->     Yes
            | (Y)              |                       |
            | 477777           |                     ( C )
            +------------------+
```

TF26:   DIVIDE A BY (Y)   26 xxxx
                                 V

SPECIFICATION SYMBOL
SB-10163

TITLE: TF27 - DIVIDE A BY Y+B (27xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF27   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: FWS modified by TLR   DATE: 8 Dec. 67

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 22

DESCRIPTION:

This subroutine checks the Divide A By A+B command. AL and AU
are entered with test-pattern constants and B with a constant, and
a DIVAB command is executed. The validity of the result is
checked by comparing AL to a test pattern, and if correct the
validity of AU is checked by entering a new constant in B if A
equals zero. Another 27 command is executed and validity checked
as before except for different test-pattern constants. If no
error is detected by any of the validity checks, an exit is made
to the executive routine (COMA) to continue the program. If an
error is detected an exit is made to the display subroutine. AU
will contain the remainder of the divide, and AL the quotient; if
PROGRAM STOP 0 is set, CO will display the function code and the
error may be evaluated. Upon return to this subroutine (TF27) an
exit is made to the executive routine (COMA) to check for continuing
the test or recycling this subroutine (TF27).

SPECIFICATION SYMBOL
SB-10163

TITLE: TF27

INPUT PARAMETERS (Listed Sequentially):

COMA   TEST PATTERNS

TPAT1	000000
TPAB1	000001
TPAB4+1	277777
TCO	777776
TCUT	500000

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1
BUFF2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA - (EXEC)
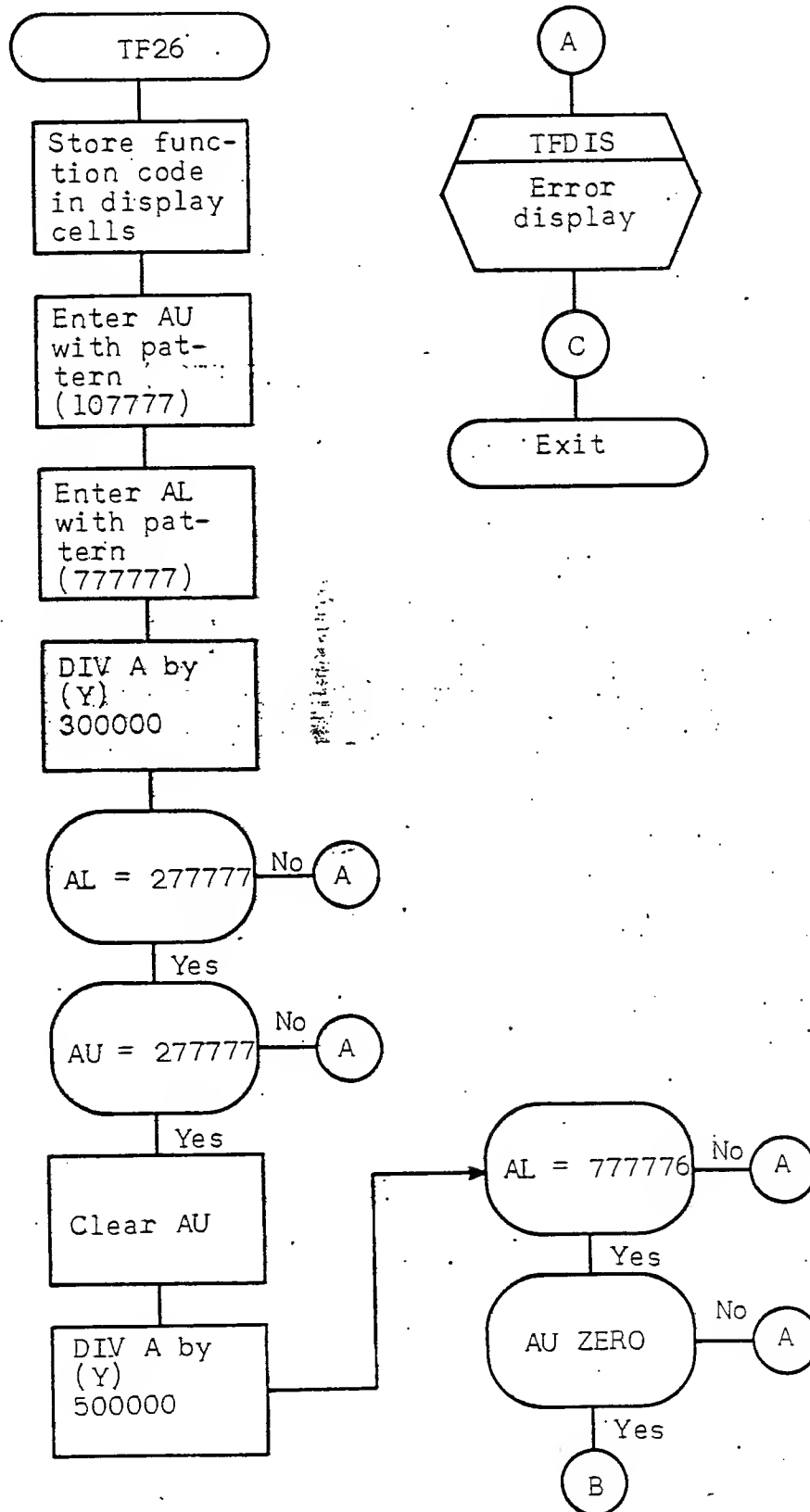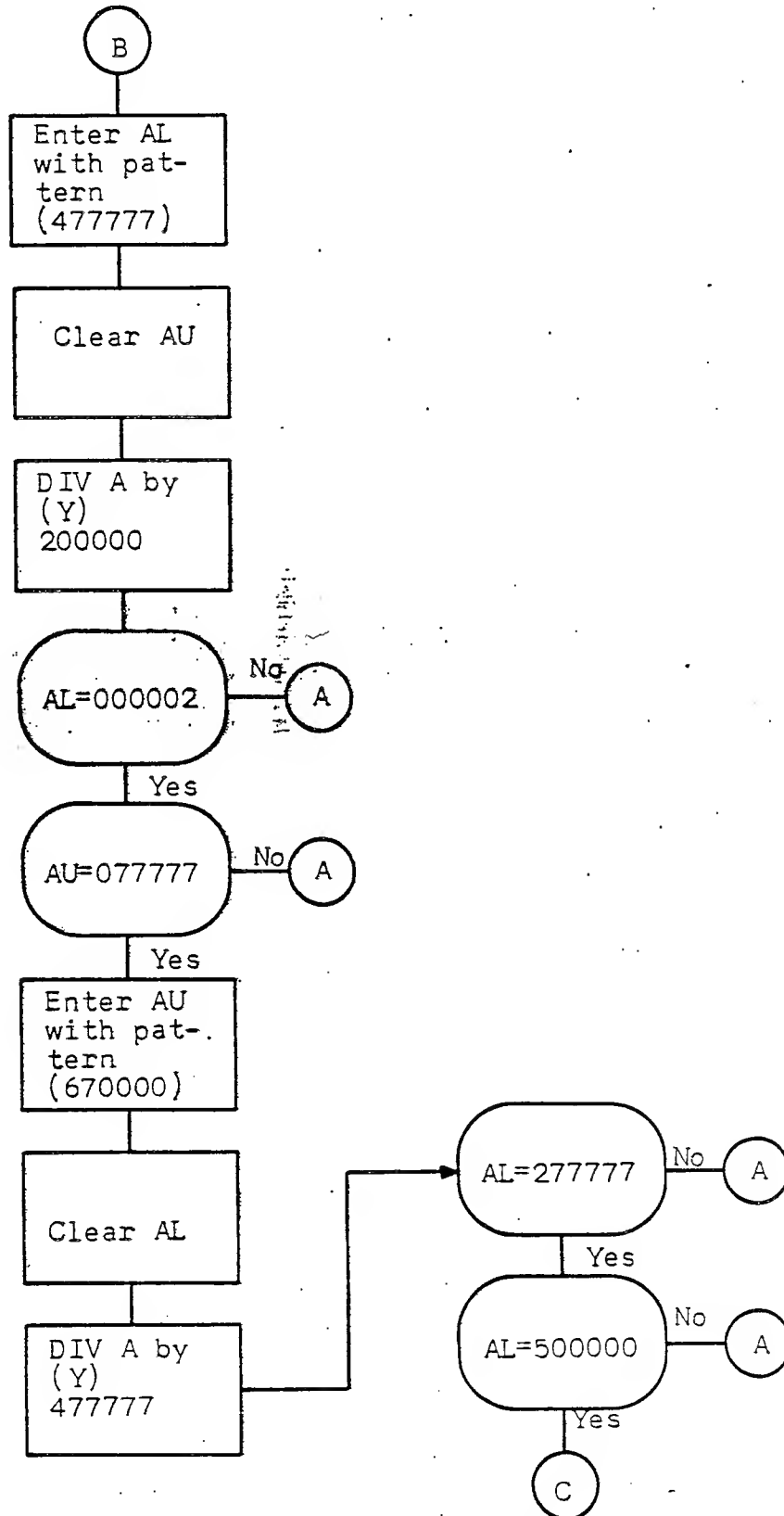TFDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY
PROGRAM STOP 0 - Remainder in AU
                 Quotient in AL
                 Function code (27xxxx) in CO
PROGRAM SKIP 4 - Set for console error display only
                 Not set for error typeout (Function Code 27)
PROGRAM SKIP 0 - Not set to continue test
               - Set to recycle subroutine (TF27)
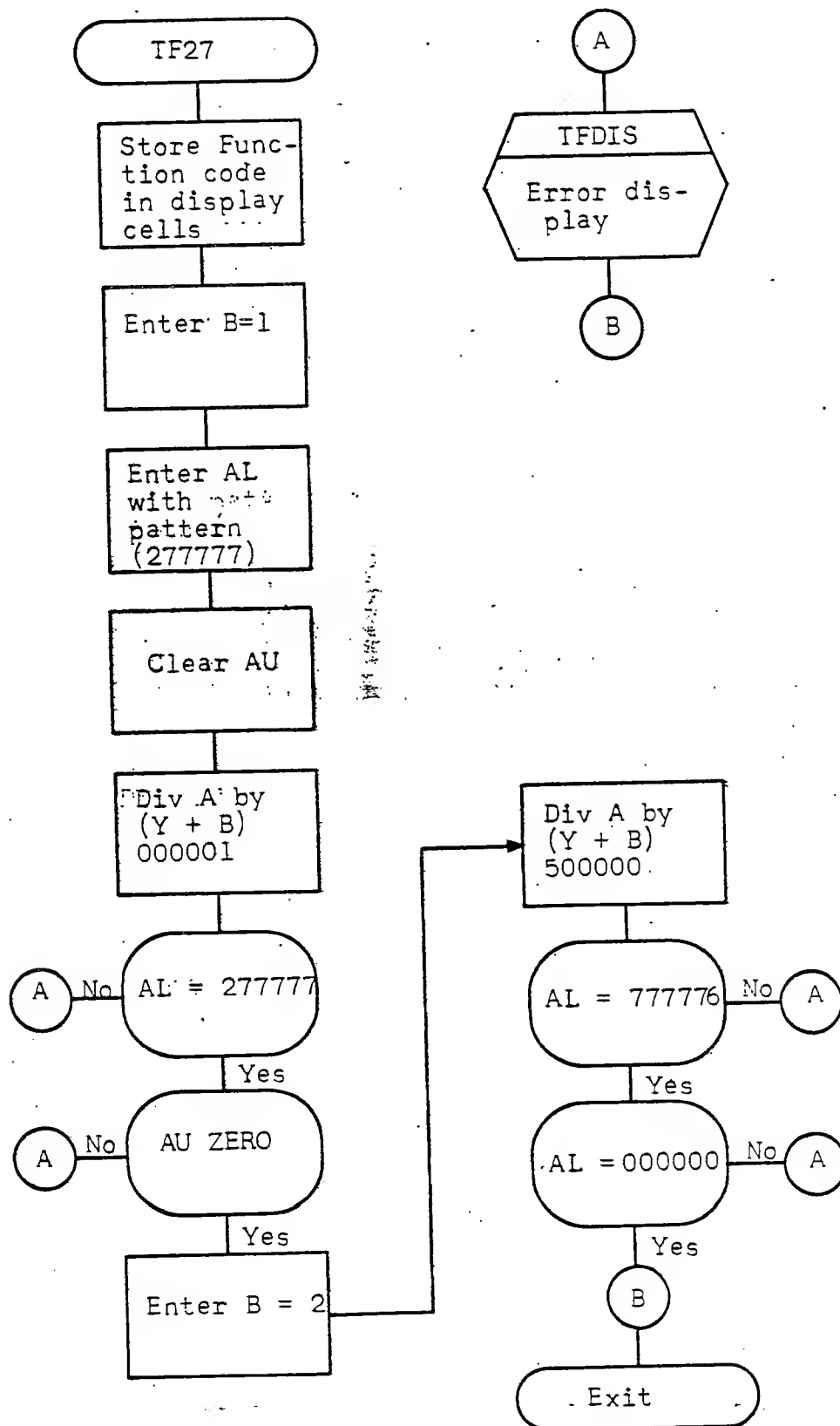
SPECIFICATION SYMBOL
SB-10163

```
        ╭─────────────╮                              ╭───╮
        │    TF27     │                              │ A │
        ╰──────┬──────╯                              ╰─┬─╯
               │                                       │
        ┌──────┴──────┐                         ╱──────┴──────╲
        │ Store Func- │                        ╱    TFDIS      ╲
        │ tion code   │                        ╲──────────────╱
        │ in display  │                         ╲ Error dis-  ╱
        │ cells       │                          ╲   play    ╱
        └──────┬──────┘                           ╲─────┬───╱
               │                                        │
        ┌──────┴──────┐                              ╭──┴──╮
        │  Enter B=1  │                              │  B  │
        │             │                              ╰─────╯
        │             │
        └──────┬──────┘
               │
        ┌──────┴──────┐
        │ Enter AL    │
        │ with        │
        │ pattern     │
        │ (277777)    │
        └──────┬──────┘
               │
        ┌──────┴──────┐
        │  Clear AU   │
        │             │
        │             │
        └──────┬──────┘
               │
        ┌──────┴──────┐                      ┌──────────────┐
        │ Div A by    │                      │  Div A by    │
        │ (Y + B)     │                      │  (Y + B)     │
        │ 000001      │                      │  500000      │
        └──────┬──────┘                      └──────┬───────┘
               │                                    │
  ╭───╮      ╱─┴─╲                               ╱──┴──╲
  │ A │─No──( AL = 277777 )            ( AL = 777776 )─No─( A )
  ╰───╯      ╲─┬─╱                               ╲──┬──╱
             Yes                                  Yes
  ╭───╮      ╱─┴─╲                               ╱──┴──╲
  │ A │─No──(  AU ZERO )              ( AL = 000000 )─No─( A )
  ╰───╯      ╲─┬─╱                               ╲──┬──╱
             Yes                                  Yes
        ┌──────┴──────┐                           ╭──┴──╮
        │ Enter B = 2 │───────────────────────────│  B  │
        │             │                           ╰─────╯
        └─────────────┘                      ╭──────┴──────╮
                                             │    Exit     │
                                             ╰─────────────╯
```

TF27:   DIVIDE A BY (Y+B) 27$\underline{\text{xxxxx}}$

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PROGRAM DATA PAGE

SPECIFICATION SYMBOL
SB-10163

TITLE: TF30 - INDIRECT RETURN JUMP (30xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF30 _____ KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by TER _____ DATE: 8 Dec. 67

NUMBER OF L$_4$ OUTPUT INSTRUCTIONS: 21

DESCRIPTION:

This subroutine checks the Indirect Return Jump command. An IRJP command is executed to a subroutine which updates the address of its entry return jump address by one, and returns the routine to the next, sequential, 30 command. If correct, this is repeated until all Indirect Jump commands have been executed, then an exit is made to the executive routine (COMA). If an error is detected, an exit is made to the display subroutine. If PROGRAM STOP 0 is set, CO will contain the function code and the error may be evaluated. (There is no error display in AU or AL.) Upon return to this subroutine (TF30) an exit is made to the executive routine (COMA) to check for continuing the test or recycling this subroutine (TF30).

A-1974

TITLE: TF30

INPUT PARAMETERS (Listed Sequentially):

COMA TEST PATTERNS
TPAT1   000000

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1
BUFF2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA - (EXEC)
TFDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY
PROGRAM STOP 0 - No error display in AU or AL
Function code (30xxxx) in CO
PROGRAM SKIP 4 - Set for console error display only
Not set for error typeout (Function Code 30)
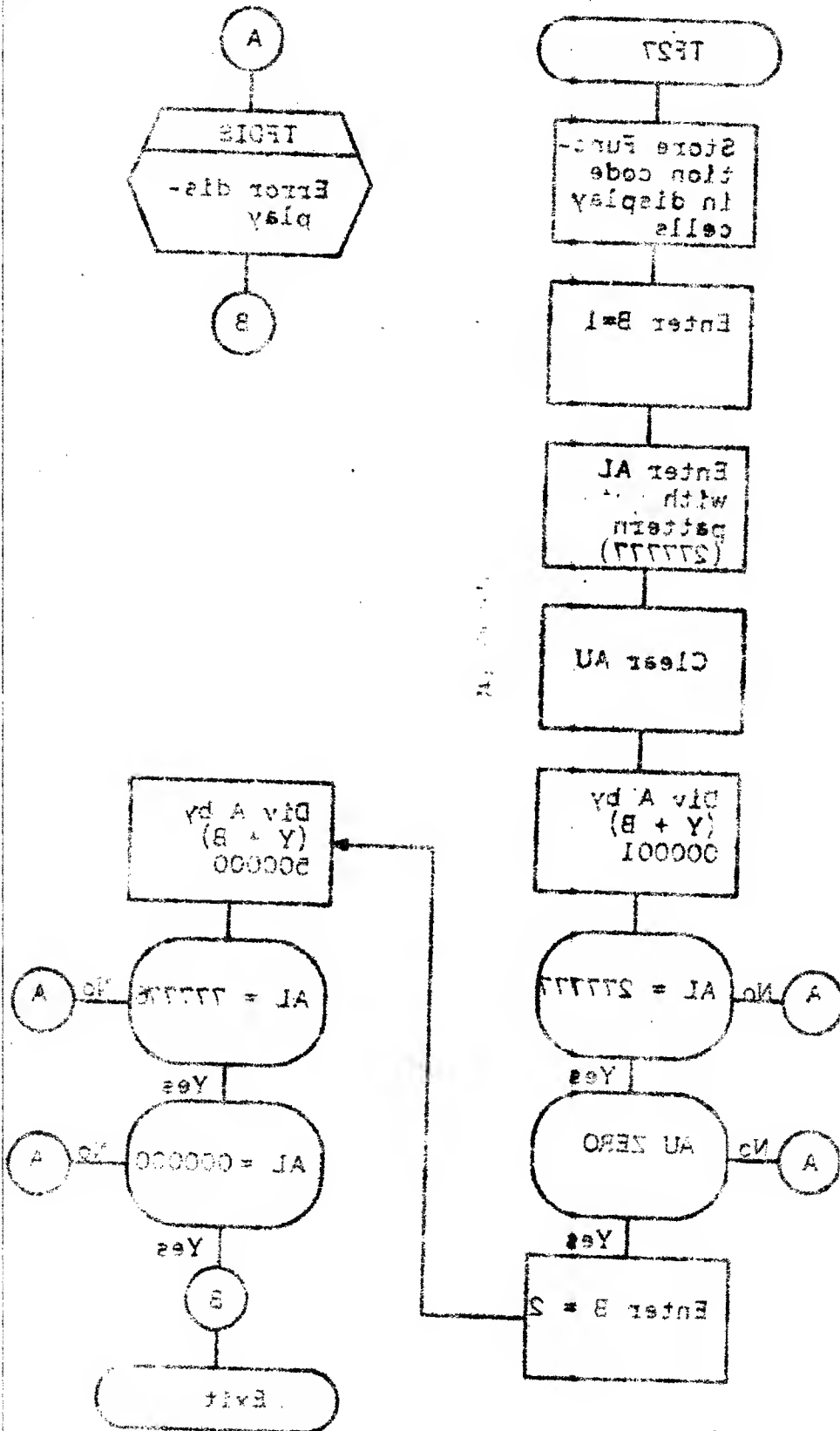PROGRAM SKIP 0 - Not set to continue test
Set to recycle subroutine (TF30)

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SPECIFICATION SHEET

| SHEET 259 | REVISION — |

SPECIFICATION SYMBOL
SB-10163

```
                          ( TF30 )
                             │
                  ┌──────────────────────┐
                  │  Store func-          │
                  │  code in buf-         │
                  │  fer display         │
                  │  cells                │
                  └──────────────────────┘
                             │
                  ──────────►( )
                  │          │
                  │ ┌──────────────────────┐
                  │ │  Indirect re-         │
                  │ │  turn jump to         │
                  │ │  selected             │
                  │ │  address              │
                  │ └──────────────────────┘
                  │          │
                  │ ┌──────────────────────┐
                  │ │  Indirect jump        │
                  │ │  to resultant         │
                  │ │  address              │
                  │ └──────────────────────┘
                  │          │
                  │   ( Jump cor-    )──No──►┌──────────────────┐
                  │   (   rect       )       │ Store func-      │
                  │          │               │ tion code in     │
                  │         Yes              │ console dis-     │
                  │   ( All in-   )          │ play cell        │
                  └No─(  direct re-)          └──────────────────┘
                      (  turn jumps)                  │
                      (  complete  )           ┌─────────────┐
                             │                 │   TFDIS     │
                            Yes                │ Error display│
                             │                 └─────────────┘
                            ( )◄──────────────────────┘
                             │
                          ( Exit )
```

TF30:   INDIRECT RETURN JUMP

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PROGRAM DATA PAGE

SPECIFICATION SYMBOL

SB-10163

TITLE: TF31 - INDIRECT RETURN JUMP PLUS B (31xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF31   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by TLR   DATE: 8 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 36

DESCRIPTION:

This subroutine checks the Indirect Return Jump Plus B command.
B is entered with a constant and then an IRJPB command is executed
followed by an indirect jump to the resultant address (the entry
to a subroutine). If the execution is proper, the next, sequential,
test constant is checked by exiting from the subroutine and is
entered into B, and the foregoing sequence is repeated until the
prescribed number of 31- commands have been executed. If an error
is detected an exit is made to the display subroutine. If PROGRAM
STOP 0 is set, CO will display the function code and the error
may be evaluated. (There is no error display in AU or AL). Upon
return to this subroutine (TF31) an exit is made to the executive
routine (COMA) to check for continuing the test or recycling this
subroutine (TF31).

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SPECIFICATION SYMBOL
SB-10163

TITLE: TF31

INPUT PARAMETERS (Listed Sequentially):

COMA   TEST PATTERNS

                          TPAT1   000000
                          TCO   777776

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1
BUFF2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA - (EXEC)
TFDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:
ERROR DISPLAY
PROGRAM STOP 0 - No display in AU or AL
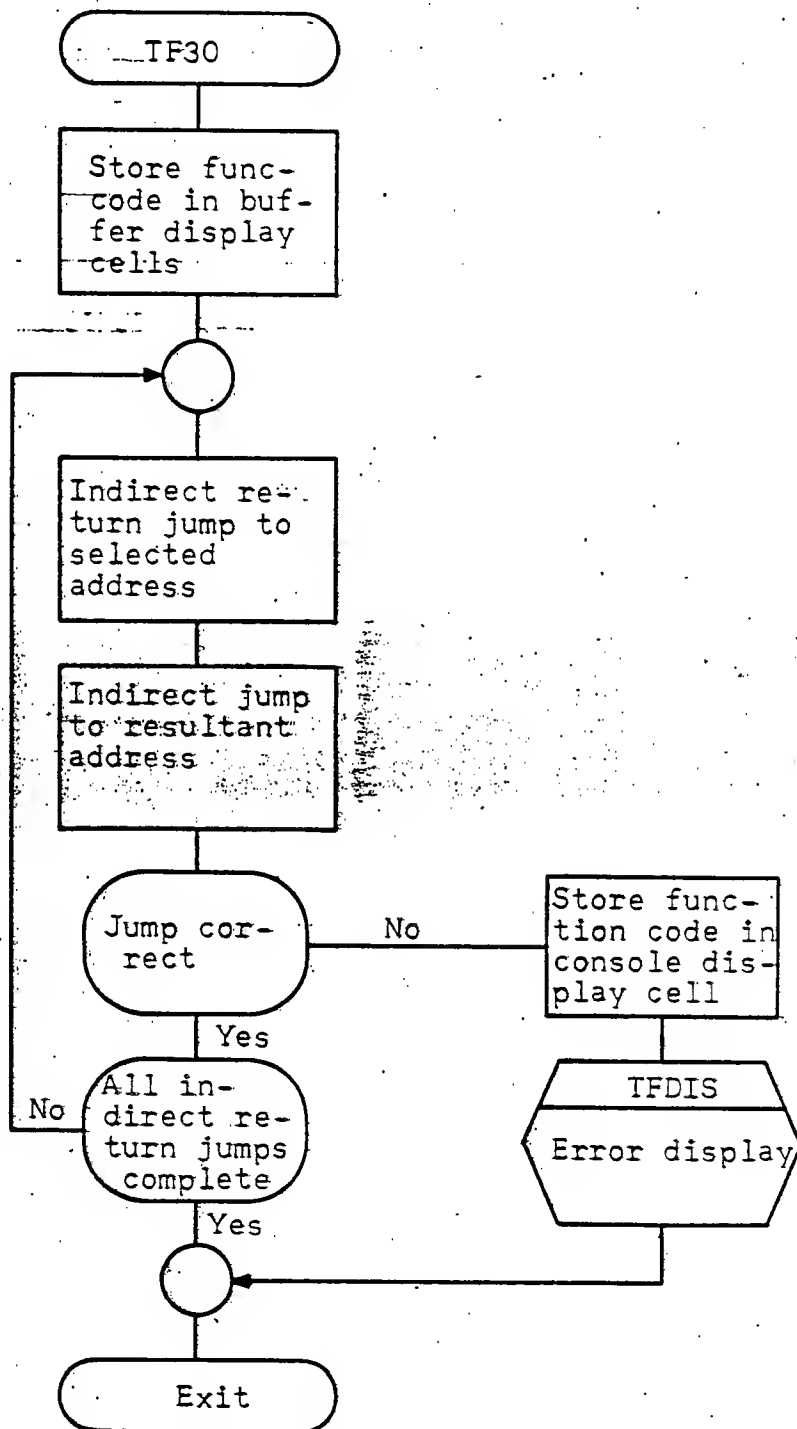   Function code (31xxxx) in CO
PROGRAM SKIP 4 - Set for console error display only
                 Not set for error typeout (Function Code 31)
PROGRAM SKIP 0 - Not set to continue test
                 Set to recycle subroutine (TF31)

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DIVISION OF SPERRY RAND CORPORATION

SPECIFICATION SHEET

SHEET 262	REVISION —

SPECIFICATION SYMBOL
SB-10163

```
        ( TF31 )
           │
   ┌───────────────┐
   │ Store function│
   │ code in buffer│
   │ display cells │
   └───────────────┘
           │
          ( )◄──────────┐
           │            │
   ┌───────────────┐    │
   │ Enter B with  │    │
   │ selected      │    │
   │ constants     │    │
   └───────────────┘    │
           │            │
   ┌───────────────┐    │
   │ Indirect re-  │    │
   │ turn jump to  │    │
   │ selected ad-  │    │
   │ dress plus B  │    │
   └───────────────┘    │
           │            │
   ┌───────────────┐    │
   │ Indirect jump │    │
   │ to resultant  │    │
   │ address       │    │
   └───────────────┘    │
           │            │          ┌───────────────┐
           │            │          │ Store function│
      (Jump correct)────No────────►│ code in console│
           │                       │ display cell  │
          Yes                      └───────────────┘
           │                               │
      (All in-                        ╱ TFDIS ╲
   No  direct re-                    ( Error display )
  ◄──  turn jumps                     ╲         ╱
       complete )
           │
          Yes
           │
          ( )◄──────────────────────────────┘
           │
        ( Exit )
```

UDL 506V 22/31-03 9/63

SPECIFICATION SYMBOL
SB-10163

TITLE: TF32 - ENTER B (32xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF32   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by TLR   DATE: 8 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 57

DESCRIPTION:

This subroutine checks the Enter B command. An ENTB command with
a test-pattern constant is executed. Then, AL is entered with B
and AU with the test-pattern used in the 32 command. Validity is
checked by comparing AL to an associated, test-pattern constant.
If correct, the next test-pattern constant is entered into B with
an ENTB command and the above cycle is repeated until all of the
test patterns have been checked. An exit is then made to the
executive routine (COMA). If an error is detected by any validity
check, AU will contain the correct pattern, AL the incorrect
pattern, and an exit is made to the display subroutine. With
PROGRAM STOP 0 set, CO will contain the function code and the
error may be evaluated. Upon return to this subroutine (TF32),
an exit is made to the executive routine (COMA) to check for con-
tinuing the test or recycling this subroutine (TF32).

SPECIFICATION SYMBOL
SB-10163

TITLE: TF32

INPUT PARAMETERS (Listed Sequentially):

COMA

TEST PATTERNS

TPAT	777777	TPAT4	770000
TPAT+1	777777	TPAT4+1	770000
TPAT1	000000	TPAT5	007777
TPAT1+1	000000	TPAT5+1	007777
TPAT2	252525	TPAT6	707070
TPAT2+1	252525	TPAT6+1	707070
TPAT3	525252	TPAT7	070707
TPAT3+1	525252	TPAT7+1	070707

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1
BUFF2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA — (EXEC)
TFDIS — Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY
PROGRAM STOP 0 — Correct information in AU
                 Incorrect information in AL
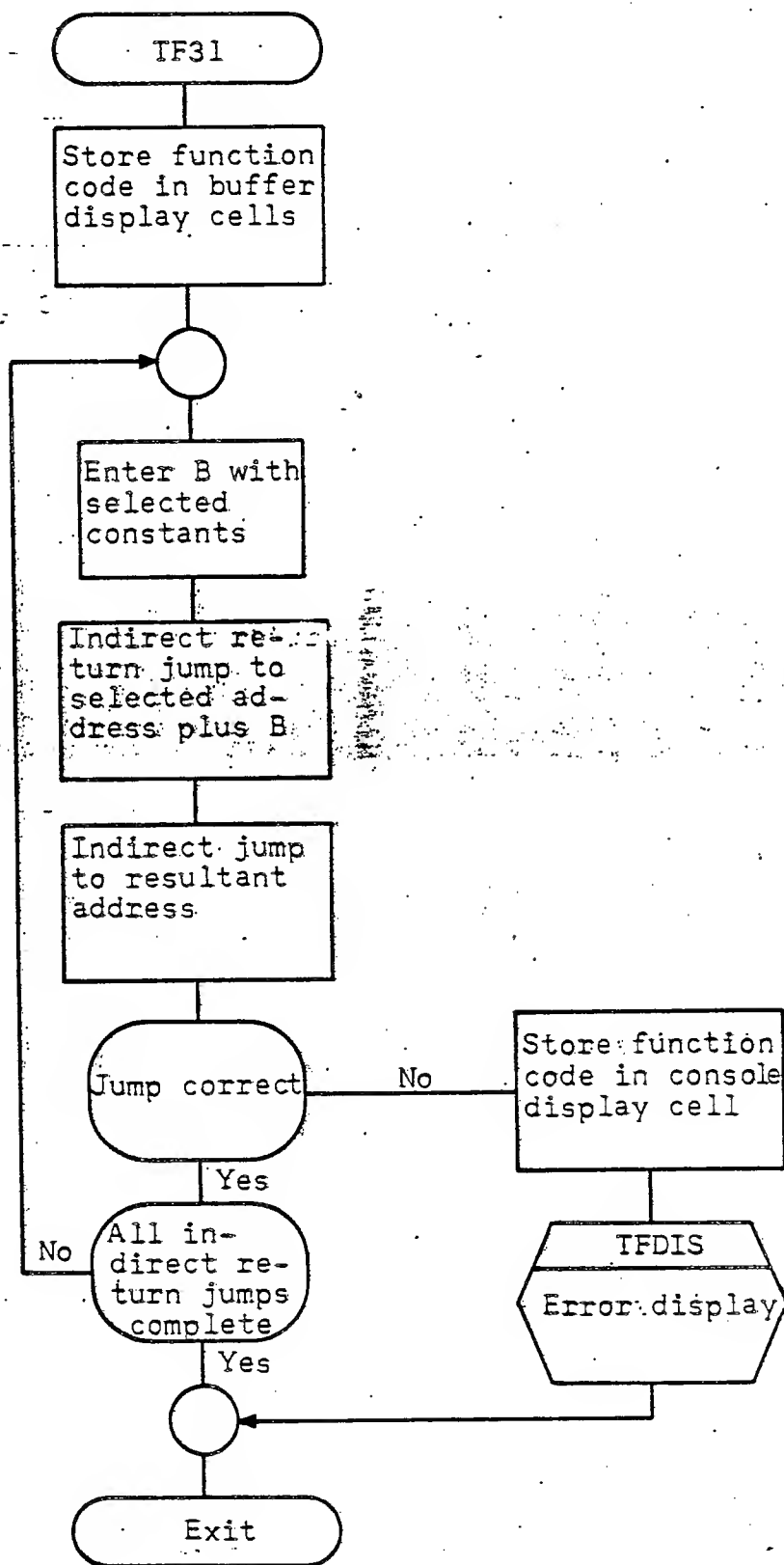   Function code (32xxxx) in CO
PROGRAM SKIP 4 — Set for console error display only
                 Not set for error typeout (Function Code 32)
PROGRAM SKIP 0 — Not set to continue test
                 Set to recycle subroutine (TF32)
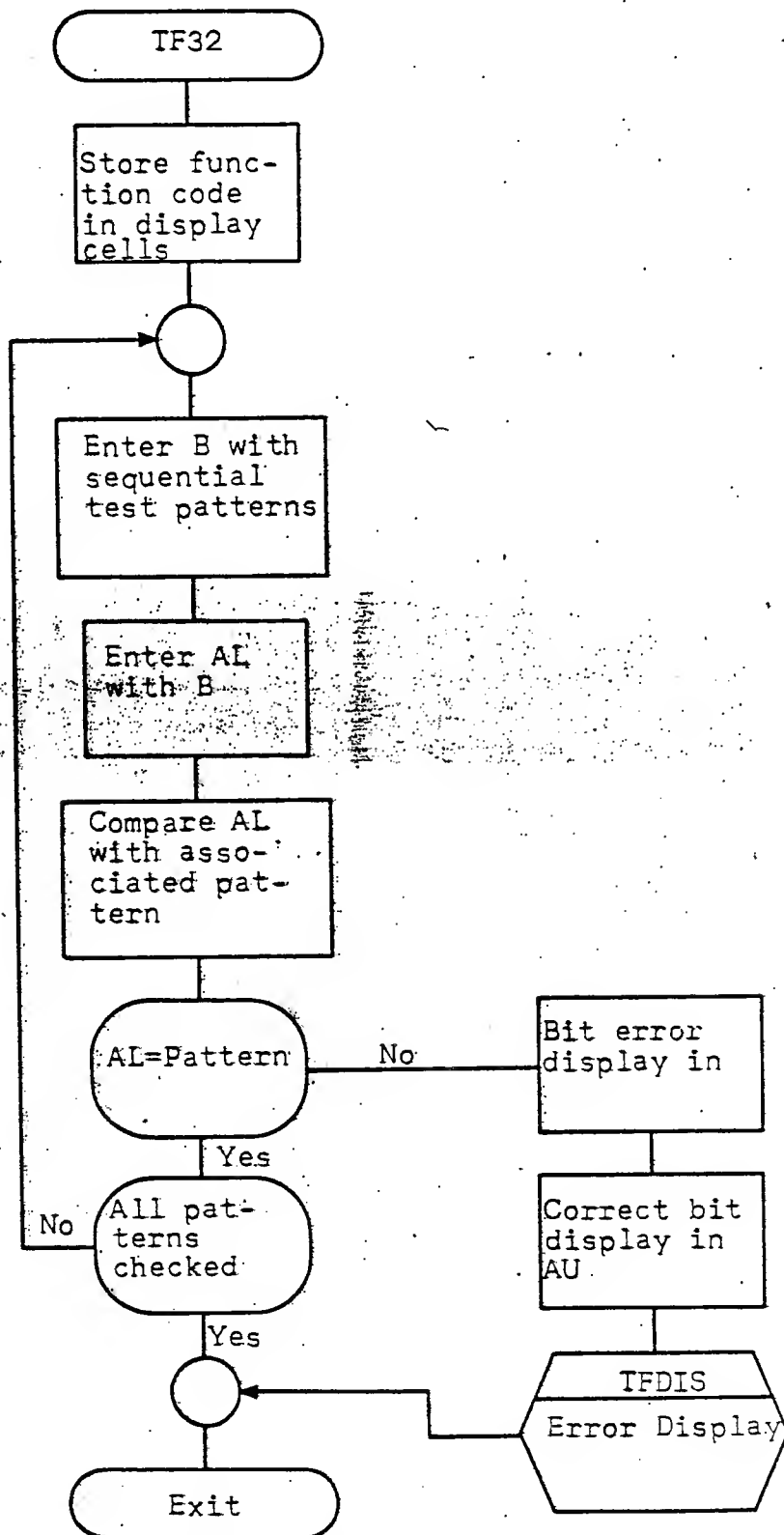
```
                    ┌──────────────┐
                    (    TF32      )
                    └──────────────┘
                           │
                    ┌──────────────┐
                    │ Store func-  │
                    │ tion code    │
                    │ in display   │
                    │ cells        │
                    └──────────────┘
                           │
                         ( ● )
                           │
                    ┌──────────────┐
                    │ Enter B with │
                    │ sequential   │
                    │ test patterns│
                    └──────────────┘
                           │
                    ┌──────────────┐
                    │ Enter AL     │
                    │ with B       │
                    └──────────────┘
                           │
                    ┌──────────────┐
                    │ Compare AL   │
                    │ with asso-   │
                    │ ciated pat-  │
                    │ tern         │
                    └──────────────┘
                           │
                    ( AL=Pattern )───No──►┌──────────────┐
                           │              │ Bit error    │
                         Yes              │ display in   │
                           │              └──────────────┘
                    ( All pat-  )                │
          No───────( terns      )          ┌──────────────┐
                   ( checked    )          │ Correct bit  │
                           │               │ display in   │
                         Yes               │ AU           │
                           │               └──────────────┘
                         ( ● )◄──────────────────┤
                           │              ╱ TFDIS        ╲
                    ┌──────────────┐      ╲ Error Display ╱
                    (   Exit       )
                    └──────────────┘
```

TF32: ENTER B

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PROGRAM DATA PAGE

SPECIFICATION SYMBOL
SB-10163

TITLE: TF33 - ENTER B MODIFIED BY B (33xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF33   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by TLR   DATE: 8 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 58

DESCRIPTION:

This subroutine checks the Enter B Modified By B command. A test-
pattern constant is entered into B and an ENTBB command is executed.
Validity is checked by entering AL with the constants of B, AU with
the test pattern of the Enter B plus B command, and comparing AL
with an associated test pattern. If correct, the next constant
is entered into B and cycle is repeated until all patterns have
been checked. An exit is then made to the executive routine (COMA).
If an error is detected, an exit is made to the display subroutine.
AU will contain the correct pattern, AL the incorrect pattern and,
with PROGRAM STOP 0 set, CO will contain the function code and the
error may be evaluated. Upon return to this subroutine (TF33)
an exit is made to the executive routine (COMA) to check for con-
tinuing the test or recycling this subroutine (TF33).

SPECIFICATION SYMBOL
SB-10163

TITLE: TF33

INPUT PARAMETERS (Listed Sequentially):

COMA

TEST PATTERNS

TPAT	777777	TPAT5+1	007777
TPAT+1	777777	TPAT6	707070
TPAT1	000000	TPAT7	070707
TPAT2	252525	TPAB1	000001
TPAT3	525252	TPAB1+1	777776
TPAT3+1	525252	TPAS4	000002
TPAT4	770000	TPAS5	000004
TPAT5	007777	TPAS7	777775

OUTPUT PARAMETERS (Listed Sequentially):

BUFF2
BUFF1
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA – (EXEC)
TFDIS – Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY
PROGRAM STOP 0 – Correct information in AU
              Incorrect information in AL
              Function code (33xxxx) in CO
PROGRAM SKIP 4 – Set for console error display only
              Not set for error typeout (Function Code 33)
PROGRAM SKIP 0 – Not set to continue test
              Set to recycle subroutine (TF33)
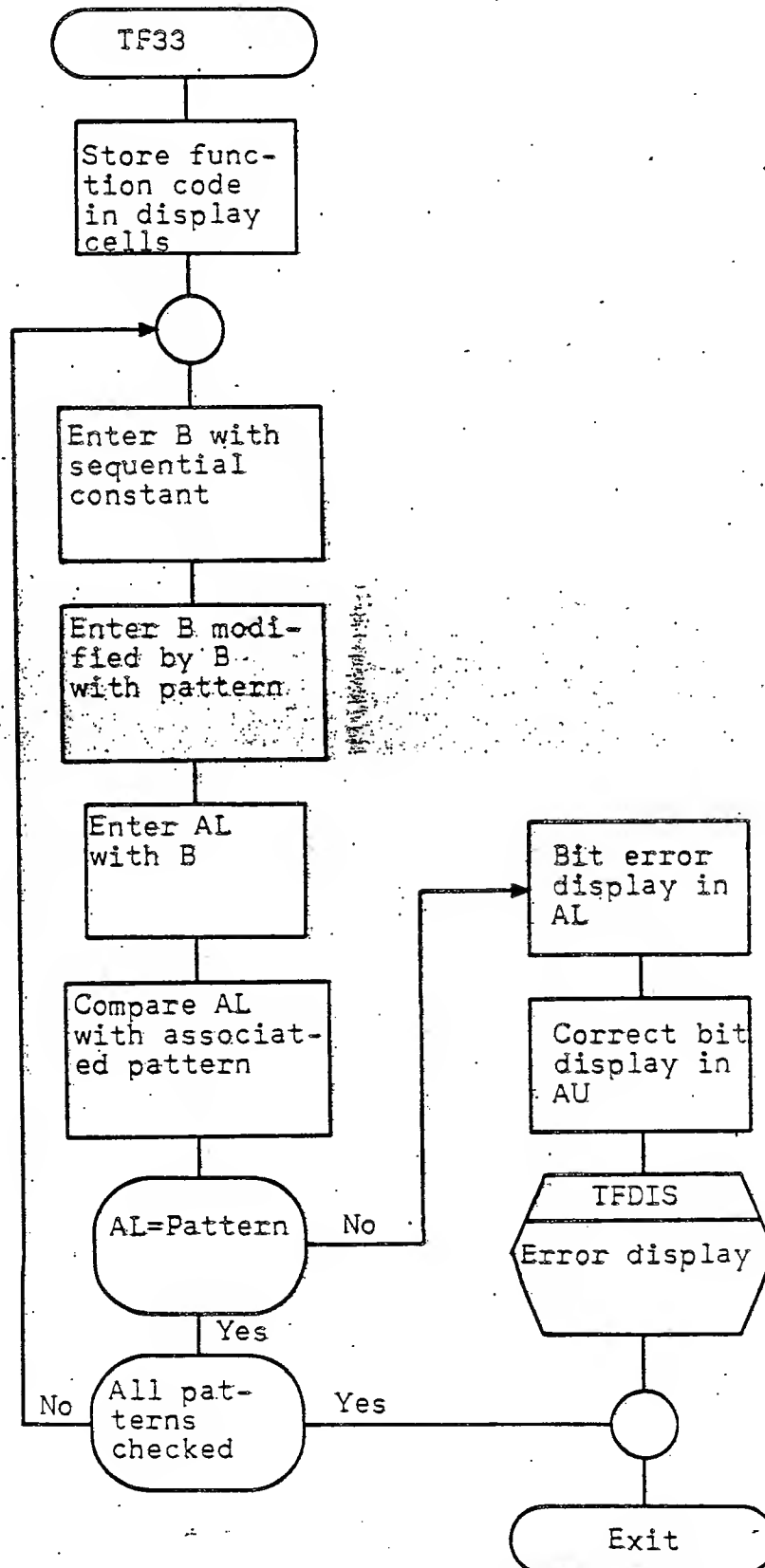
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SPECIFICATION SHEET

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SPECIFICATION SYMBOL
SB-10163

```
                    ╭─────────╮
                    │  TF33   │
                    ╰────┬────╯
                         │
               ┌─────────────────┐
               │ Store func-     │
               │ tion code       │
               │ in display      │
               │ cells           │
               └────────┬────────┘
                        │
                       (○)◄──────────┐
                        │            │
               ┌─────────────────┐  │
               │ Enter B with    │  │
               │ sequential      │  │
               │ constant        │  │
               └────────┬────────┘  │
                        │           │
               ┌─────────────────┐  │
               │ Enter B modi-   │  │
               │ fied by B       │  │
               │ with pattern    │  │
               └────────┬────────┘  │
                        │           │
               ┌─────────────────┐       ┌─────────────────┐
               │ Enter AL        │       │ Bit error       │
               │ with B          │       │ display in      │
               │                 │       │ AL              │
               └────────┬────────┘       └────────┬────────┘
                        │                         │
               ┌─────────────────┐       ┌─────────────────┐
               │ Compare AL      │       │ Correct bit     │
               │ with associat-  │       │ display in      │
               │ ed pattern      │       │ AU              │
               └────────┬────────┘       └────────┬────────┘
                        │                         │
                   ╱AL=Pattern╲  No ──────►  ╱  TFDIS      ╲
                   ╲          ╱              ╲ Error display╱
                        │ Yes
                  ╱ All pat-  ╲  Yes ──────────► (○)
            No ◄──╲  terns    ╱                   │
                  ╲ checked   ╱              ╭─────────────╮
                                            │    Exit     │
                                            ╰─────────────╯
```

TF33:   ENTER B MODIFIED BY B

	SPECIFICATION SYMBOL
	SB-10163

TITLE: TF34 - DIRECT JUMP (34xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF34   KEY: _____   IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by TLR   DATE: 8 Dec. 67

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 24

DESCRIPTION:

This subroutine checks a series of Direct Jump commands (JP). If
no error occurs, an exit is made to the executive routine (COMA).
If an error occurs, an exit is made to the display subroutine
(AU and AL will have no error display) where, if PROGRAM STOP O
is set, the function code will be contained in CO and the error
may be evaluated. Upon return to this subroutine (TF34) an exit
is made to the executive routine (COMA) to check for continuing the
program or recycling the subroutine (TF34).

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SPECIFICATION SHEET

PROGRAM DATA PAGE (Cont) | SHEET 270 | REVISION ⎯

SPECIFICATION SYMBOL
SB-10163

TITLE:___TF34_____

INPUT PARAMETERS (Listed Sequentially):

COMA   TEST PATTERNS
            TPAT1   000000

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1
BUFF2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):
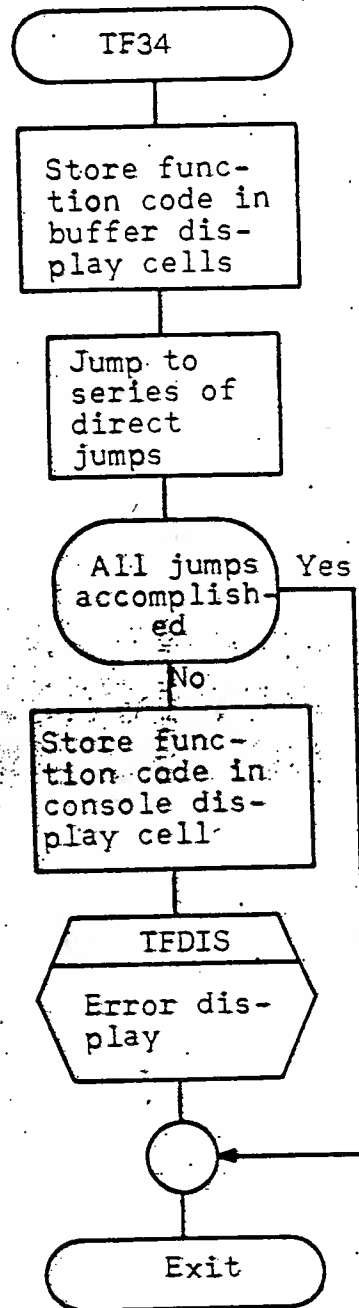
COMA - (EXEC)
TFDIS-Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY
PROGRAM STOP 0 - No display in AU or AL
                 Function code (34xxxx) in CO
PROGRAM SKIP 4 - Set for console error display only
                 Not set for error typeout (Function Code 34)
PROGRAM SKIP 0 - Not set to continue test
                 Set to recycle subroutine (TF34)

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```
                    ( TF34 )

              ┌──────────────────┐
              │ Store func-      │
              │ tion code in     │
              │ buffer dis-      │
              │ play cells       │
              └──────────────────┘

              ┌──────────────────┐
              │ Jump to          │
              │ series of        │
              │ direct           │
              │ jumps            │
              └──────────────────┘

              ╭──────────────────╮   Yes
              │  All jumps       │────────┐
              │  accomplish-     │        │
              │     ed           │        │
              ╰──────────────────╯        │
                      │ No                │
              ┌──────────────────┐        │
              │ Store func-      │        │
              │ tion code in     │        │
              │ console dis-     │        │
              │ play cell        │        │
              └──────────────────┘        │
                                          │
              ⬡─────TFDIS────────⬡        │
              │   Error dis-     │        │
              │      play        │        │
              ⬡──────────────────⬡        │
                      │                   │
                     ( ○ )◄───────────────┘
                      │
                  ( Exit )
```

TF34:   DIRECT JUMP

| SPECIFICATION SYMBOL |
| SB-10163 |

TITLE: TF35 - JUMP PLUS B (35xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF35   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by TLR   DATE: 8 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 21

DESCRIPTION:

This subroutine checks the Jump Plus B command. B is entered
with a constant and then a JPB is executed to a test address. If
the Jump is correct the next Enter B with a constant is executed;
this cycle is repeated until the prescribed number of 35-commands
have been executed. An exit is then made to the executive routine
(COMA). If the Jump is in error, an exit is made to the display
subroutine. If PROGRAM STOP O is set, CO will contain the function
code and the error may be evaluated. (AL and AU will not contain
error information). Upon return to this subroutine (TF35) an
exit is made to the executive routine (COMA) to check for continu-
ing the test or recycling this subroutine (TF35).

TITLE: __TF35__

INPUT PARAMETERS (Listed Sequentially):

COMA   TEST PATTERNS

                             TPAT1   000000

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1
BUFF2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA — (EXEC)
TFDIS — Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY
PROGRAM STOP 0 — No display in AU or AL
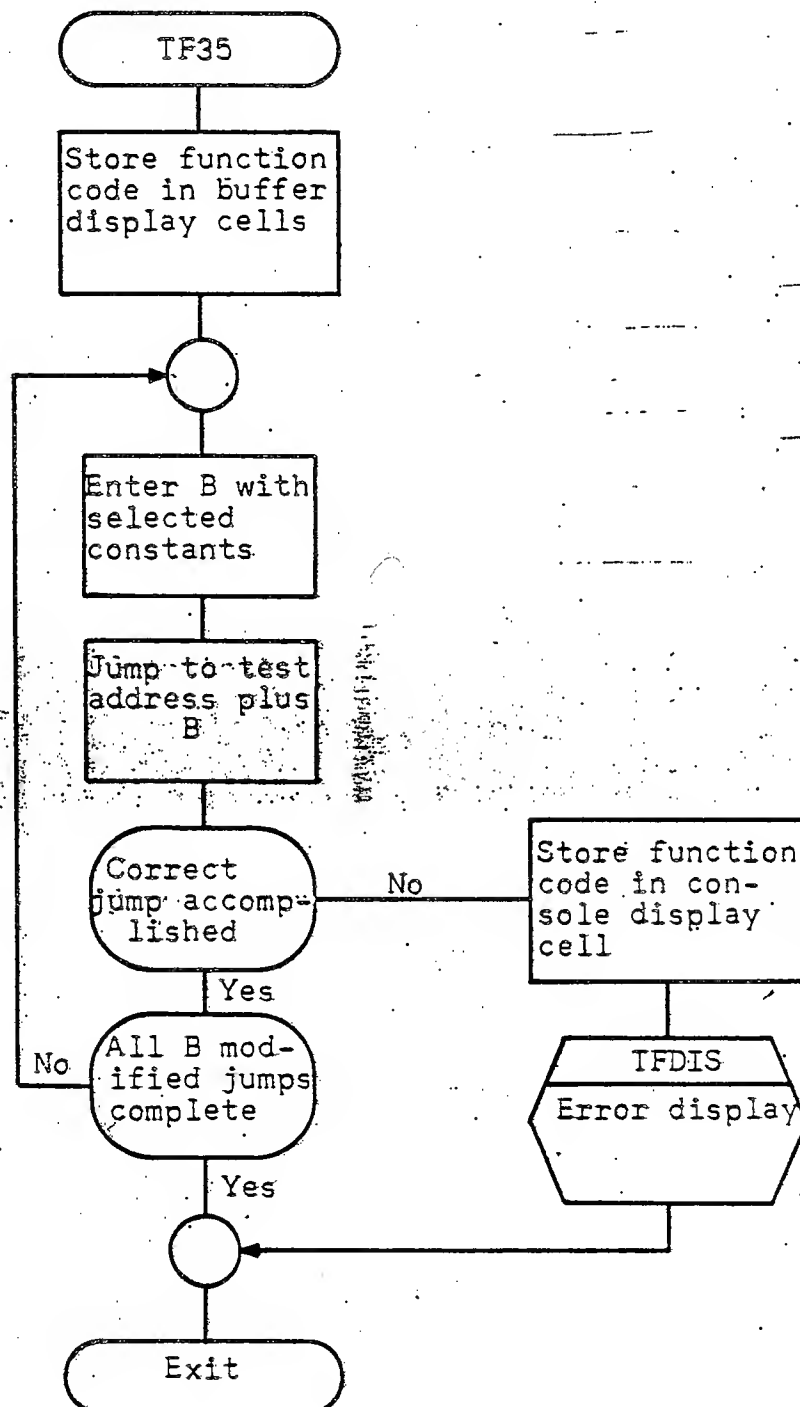   Function code (35xxxx) in CO
PROGRAM SKIP 4 — Set for console error display only
                Not set for error typeout (Function Code 35)
PROGRAM SKIP 0 — Not set to continue test
                Set to recycle subroutine (TF35)

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SPECIFICATION SHEET

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SPECIFICATION SYMBOL
SB-10163

TF35

Store function code in buffer display cells

Enter B with selected constants

Jump to test address plus B

Correct jump accomplished

Store function code in console display cell

No

Yes

All B modified jumps complete

No

TFDIS

Error display

Yes

Exit

TF35: JUMP PLUS B

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SPECIFICATION SHEET

PROGRAM DATA PAGE

SHEET 275 | REVISION —

SPECIFICATION SYMBOL
SB-10163

TITLE: TF36 - ENTER B WITH CONSTANT (SIGN EXTENDED) (36xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF36   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by TLR   DATE: 8 Dec. 67

NUMBER OF L$_4$ OUTPUT INSTRUCTIONS: 56

DESCRIPTION:

This subroutine checks the Enter B With Constant (Sign Extended) command. A ENTBK command is executed, then validity is checked by entering AL with B and the correct test-pattern in AU. An Enter B with the next constant is executed if AL is equal to zero and validity is checked by entering AL with B, AU with the associated test-pattern, and comparing AL with the associated test-pattern. If correct, the above cycle with compare is repeated until all patterns have been checked. An exit is then made to the executive routine (COMA). If an error is detected by any of the validity checks, an exit is made to the display subroutine. AU will contain the correct pattern, AL the incorrect pattern and, with PROGRAM STOP O set, CO will contain the function code and the error may be evaluated. Upon return to this subroutine (TF36), an exit is made to the executive routine (COMA) to check for continuing the test or recycling this subroutine (TF36).

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SPECIFICATION SHEET

PROGRAM DATA PAGE (Cont)

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SPECIFICATION SYMBOL
SB-10163

TITLE: TF36

INPUT PARAMETERS (Listed Sequentially):

COMA   TEST PATTERNS

TPAT	777777
TPAT1	000000
TPAB1	000001
TPAB2+1	000505
TPAK	002020
TPAK5	775252
TPAK6	002525
TPAK7	777070

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1
BUFF2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA - (EXEC)
TFDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY
PROGRAM STOP 0 - Correct information in AU
                 Incorrect information in AL
                 Function code (36xxxx) in CO
PROGRAM SKIP 4 - Set for console error display only
                 Not set for error typeout (Function Code 36)
PROGRAM SKIP 0 - Not set to continue test
                 Set to recycle subroutine (TF36)
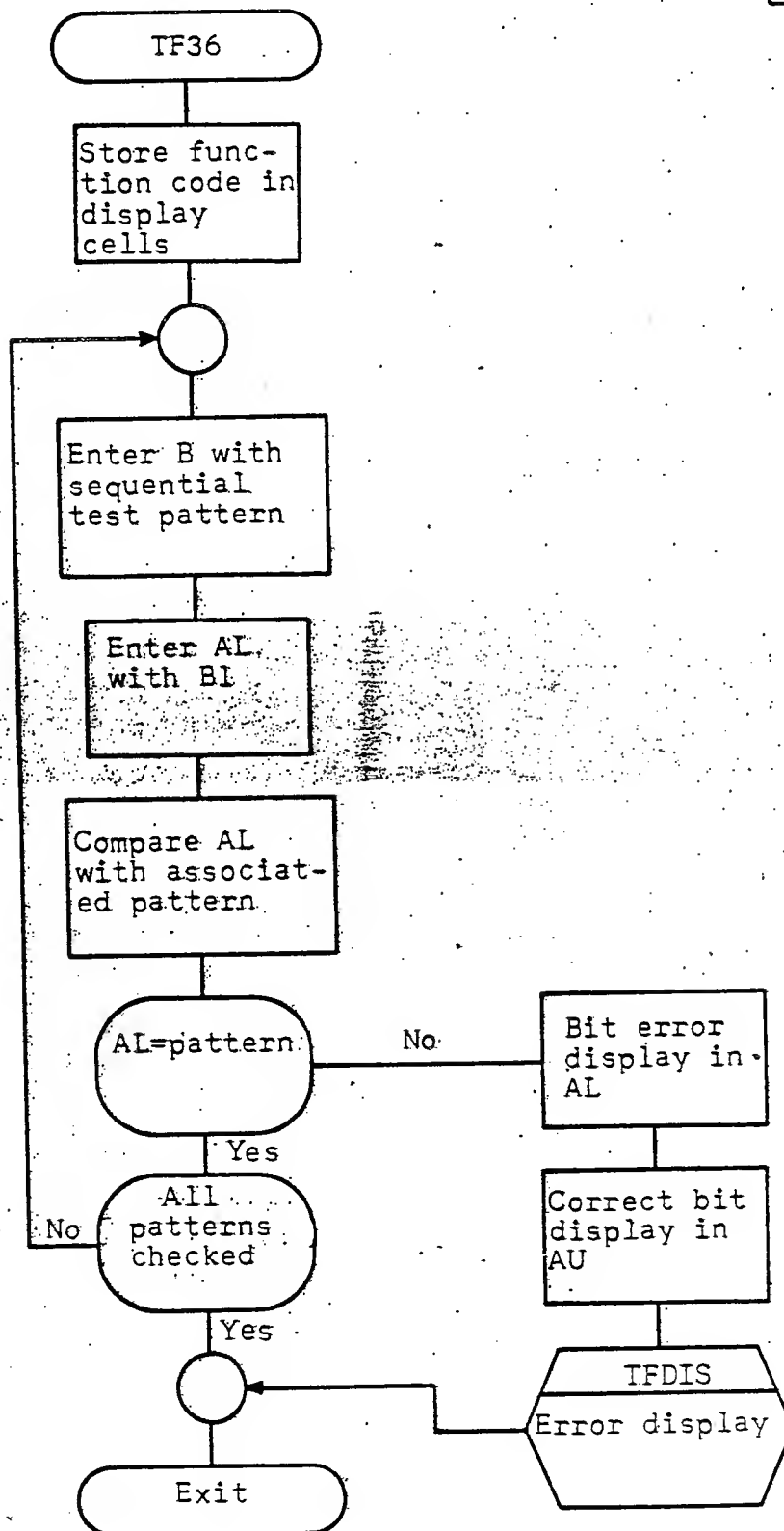
A-1975

SPECIFICATION SHEET

UNIVAC
DIVISION OF SPERRY RAND CORPORATION

SHEET 277	REVISION

SPECIFICATION SYMBOL
SB-10163

```
              ┌─────────────┐
              │    TF36      │
              └──────┬──────┘
                     │
              ┌──────┴──────┐
              │ Store func- │
              │ tion code in│
              │ display     │
              │ cells       │
              └──────┬──────┘
                     │
                    (○)◄──────────┐
                     │            │
              ┌──────┴──────┐     │
              │ Enter B with│     │
              │ sequential  │     │
              │ test pattern│     │
              └──────┬──────┘     │
                     │            │
              ┌──────┴──────┐     │
              │ Enter AL    │     │
              │ with BI     │     │
              └──────┬──────┘     │
                     │            │
              ┌──────┴──────┐     │
              │ Compare AL  │     │
              │ with associ-│     │
              │ ated pattern│     │
              └──────┬──────┘     │
                     │            │
              ╭──────┴──────╮  No    ┌─────────────┐
              │ AL=pattern  ├────────│ Bit error   │
              ╰──────┬──────╯        │ display in   │
                     │ Yes          │ AL          │
              ╭──────┴──────╮        └──────┬──────┘
         No   │    All      │               │
        ┌─────┤  patterns   │        ┌──────┴──────┐
        │     │  checked    │        │ Correct bit │
        │     ╰──────┬──────╯        │ display in  │
        │            │ Yes          │ AU          │
        │           (○)◄──────┐     └──────┬──────┘
        │            │         │           │
        │     ┌──────┴──────┐  │    ╱──────┴──────╲
        │     │    Exit     │  │   │    TFDIS      │
        │     └─────────────┘  └───┤ Error display │
        │                          ╲──────────────╱
        └──────────────────────────────┘
```

TF36: ENTER B WITH CONSTANT SIGN EXTENDED

SPECIFICATION SYMBOL
SB-10163

TITLE: TF37 - ENTER B WITH CONSTANT PLUS B (SIGN EXT.) (37xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF37   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by TLR   DATE: 8 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 59

DESCRIPTION:

This subroutine checks the Enter B With Constant Plus B (Sign
Extended) command. B is entered with a constant, and an ENTBKB
is executed using another constant. Validity is checked by en-
tering AL with the result of the ENTBKB command, and AU with the
correct, test-pattern constant; AL and the associated test pattern
are compared, and if correct, the next sequential constant is
entered into B, and the cycle repeated until all test patterns have
been checked. An exit is then made to the executive routine (COMA).
If an error is detected by any of the validity checks, an exit is
made to the display subroutine. AU will contain the correct pattern,
AL the incorrect pattern. If PROGRAM STOP O is set, CO will con-
tain the function code and the error may be evaluated. Upon re-
turn to this subroutine (TF37) an exit is made to the executive
routine (COMA) to check for continuing the test or recycling this
subroutine (TF37).

	SPECIFICATION SYMBOL
	SB-10163

TITLE: TF37

INPUT PARAMETERS (Listed Sequentially):

COMA

TEST PATTERNS

TPAT1	000000
TPAK6	002525
TPAK7+1	000707
TPAS1	000017
TPAS2	000015
TPAS3	000012
TPAS4	000002

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1
BUFF2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA - (EXEC)
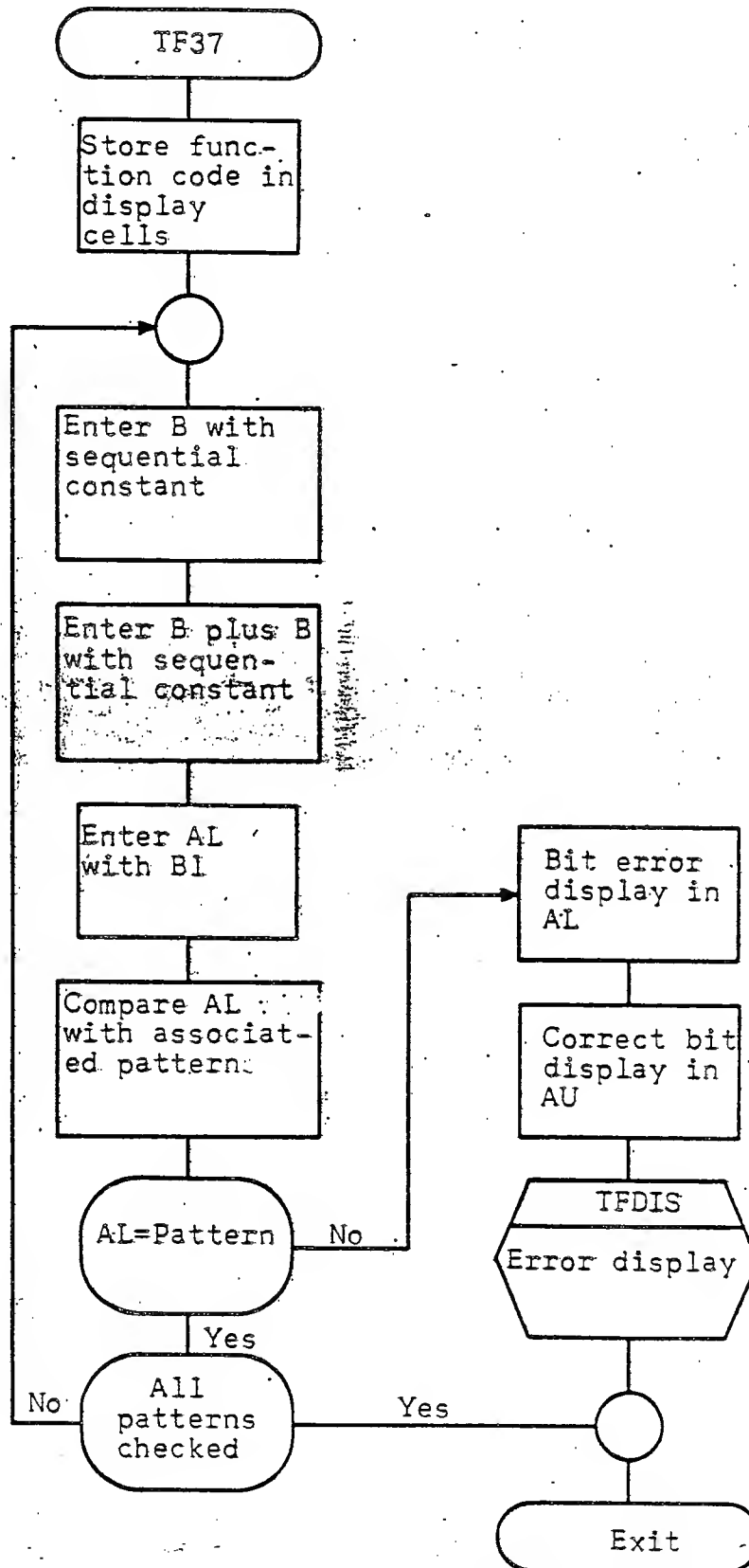TFDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY
PROGRAM STOP 0 — Correct information in AU
       Incorrect information in AL
       Function code (37xxxx) in CO
PROGRAM SKIP 4 — Set for console error display only
       Not set for error typeout (Function Code 37)
PROGRAM SKIP 0 — Not set to continue test
       Set to recycle subroutine (TF37)

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SPECIFICATION SYMBOL
SB-10163

TF37

Store function code in display cells

Enter B with sequential constant

Enter B plus B with sequential constant

Enter AL with BI

Compare AL with associated pattern

AL=Pattern — No

All patterns checked — No / Yes

Bit error display in AL

Correct bit display in AU

TFDIS
Error display

Yes

Exit

TF37:   ENTER B WITH CONSTANT PLUS B (SIGN EXT.)

TITLE: TF40 - CLEAR Y (40xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF40   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by TLR   DATE: 8 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 33

DESCRIPTION:

This subroutine checks the Clear Y command. A sequential test-pattern is entered into AL followed by an entry into a subroutine where AL is stored in a test cell. Then the test cell is cleared (CL command) and validity is checked by entering the contents of the test cell into AL. If correct, AL is equal to zero, an exit is made from the subroutine, and the next pattern is entered into AL. This sequence is repeated until all patterns have been checked, then as exit is made to the executive routine (COMA). If an error is detected an exit is made from the subroutine to the display subroutine. AU will contain the correct pattern, AL the incorrect pattern and, if PROGRAM STOP 0 is set, CO the function code, and the error may be evaluated. Upon return to this subroutine (TF40), an exit is made to the executive routine (COMA) to check for continuing the test or recycling this subroutine (TF40).

TITLE: TF40

INPUT PARAMETERS (Listed Sequentially):

COMA   TEST PATTERNS

TPAT	777777	TPAR	TEST CELL
TPAT1	000000		
TPAT2	252525		
TPAT3	525252		
TPAT4	770000		
TPAT5	007777		
TPAT6	707070		
TPAT7	070707		

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1
BUFF2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA – (EXEC)
TEDIS – Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY –
PROGRAM STOP 0 – Correct information in AU
                 Incorrect information in AL
                 Function code (40xxxx) in CO
PROGRAM SKIP 4 – Set for console error display only
                 Not set for error typeout (Function Code 40)
PROGRAM SKIP 0 – Not set to continue test
                 Set to recycle subroutine (TF40)

```
            ┌─────────────┐
            │    TF40      │
            └─────────────┘
                  │
         ┌──────────────────┐
         │ Store func-      │
         │ tion code in     │
         │ display          │
         │ cells            │
         └──────────────────┘
                  │
                 (○)◄──────────────┐
                  │                │
         ┌──────────────────┐      │
         │ Store se-        │      │
         │ lected pat-      │      │
         │ terns in         │      │
         │ test cell        │      │
         └──────────────────┘      │
                  │                │
         ┌──────────────────┐      │
         │ Clear test       │      │
         │ cell             │      │
         └──────────────────┘      │
                  │                │
            ╭──────────╮    No   ┌──────────────┐
            │ Pattern  │────────►│ Bit error    │
            │ cleared  │         │ display in   │
            ╰──────────╯         │ AL           │
                  │ Yes          └──────────────┘
            ╭──────────╮                │
     No     │ All      │         ┌──────────────┐
   ◄────────│ patterns │         │ Correct bit  │
            │ checked  │         │ display in   │
            ╰──────────╯         │ AU           │
                  │ Yes          └──────────────┘
                 (○)◄───────┐          │
                  │         │    ╱─────────────╲
         ┌─────────────┐    │    │   TFDIS      │
         │    Exit      │    └────│ Error display│
         └─────────────┘         ╲─────────────╱
```

TF40:   CLEAR Y

SPECIFICATION SYMBOL
SB-10163
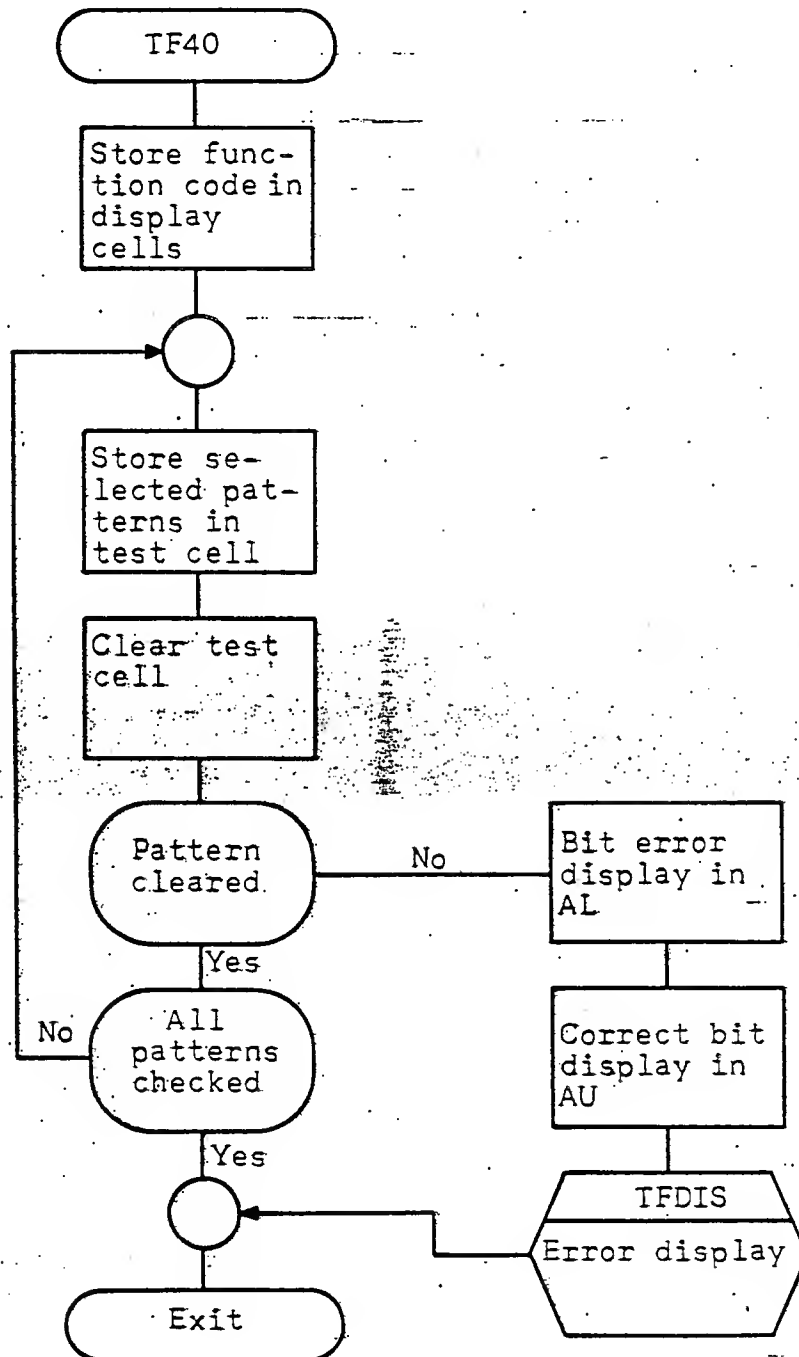
TITLE: TF41 - CLEAR Y PLUS B (41xxxx)

DECK IDENTIFIER: FACT ?

CS-1 LABEL: TF41   KEY: _____   IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by TLR   DATE: 8 Dec. 67

NUMBER OF L4 OUTPUT INSTRUCTIONS: 52

DESCRIPTION:

This subroutine checks the Clear Y Plus B command. B is entered
with a constant, AL with a test pattern, and AU with the correct
test-pattern. Then AL plus B is stored in a test cell, followed
by a clearing of the test cell with a CLB command. Validity
is checked by entering AL with the contents of the test cell, and
if A is equal to zero, the next constant is entered into B. This
sequence is repeated until all test patterns have been checked,
then an exit is made to the executive routine (COMA). If an error
is detected by any of the validity checks, AU contains the correct
pattern, and AL the incorrect pattern, and an exit is made to the
display subroutine. If PROGRAM STOP 0 is set, CO will contain
the function code and the error may be evaluated. Upon return to
this subroutine (TF41) and exit is made to the executive routine
(COMA) to check for continuing the test or recycling this sub-
routine (TF41).

SPECIFICATION SYMBOL
SB-10163

TITLE:___TF41___

INPUT PARAMETERS (Listed Sequentially):

COMA

	TEST PATTERNS		
	TPAT	777777	TPAS6	000007
	TPAT1	000000	TPAS7	777775
	TPAT2	252525	TPAT	TEST CELLS
	TPAT3	525252		
	TPAT5	007777		
	TPAB1+1	777776		
	TPAS4	000002		
	TPAS5	000004		

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1
BUFF2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA - (EXEC)
TFDIS - Error Display

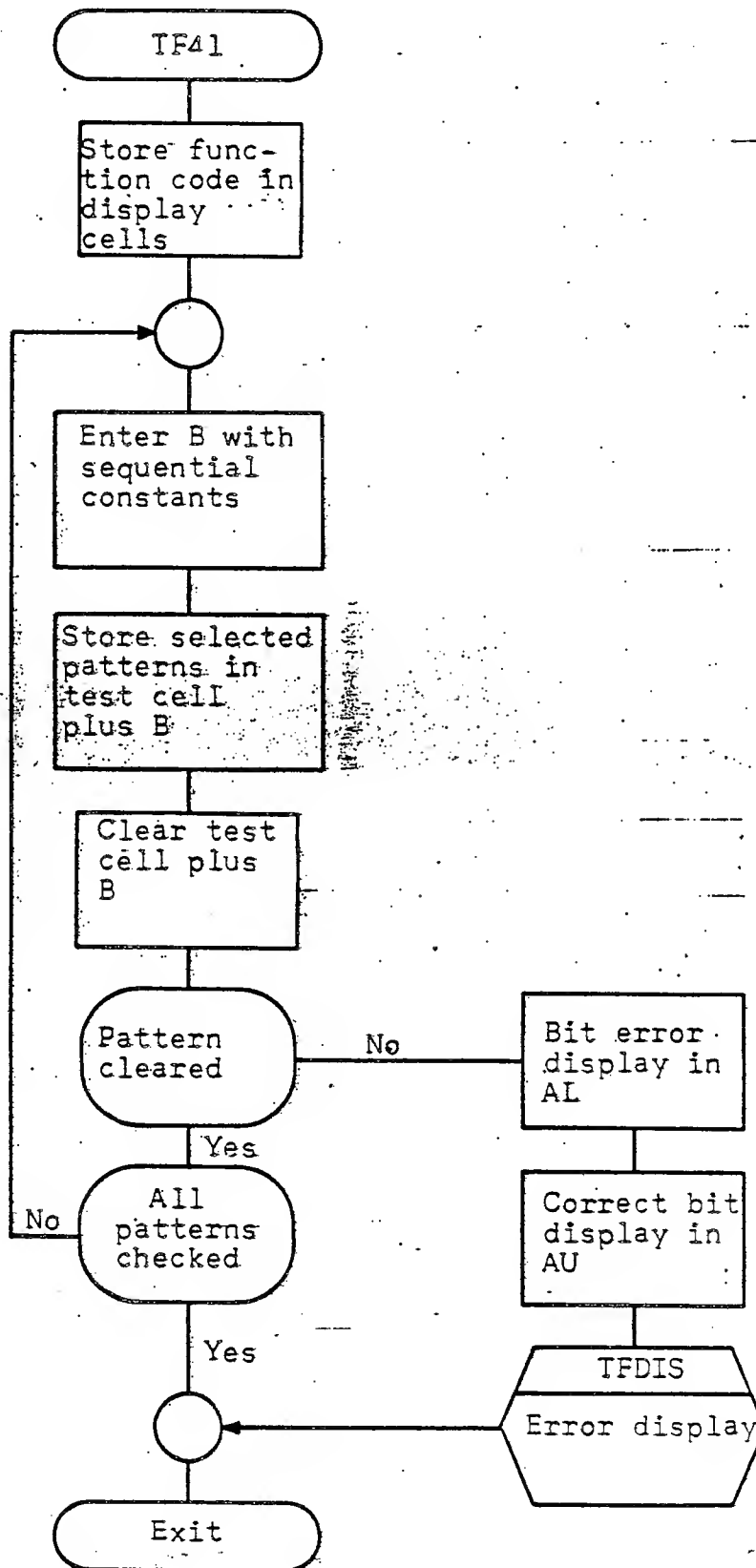**SYSTEM DATA REFERENCES:**

ALARMS AND/OR REMARKS:
ERROR DISPLAY
PROGRAM STOP 0 - Correct information in AU
      Incorrect information in AL
      Function code (41xxxx) in CO
PROGRAM SKIP 4 - Set for console error display only
      Not set for error typeout (Function Code 41)
PROGRAM SKIP 0 - Not set forcontinue test
      Set to recycle subroutine (TF41)

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SPECIFICATION SYMBOL
SB‑10163

```
                         ╭───────────────╮
                         │     TF41      │
                         ╰───────┬───────╯
                                 │
                         ┌───────┴───────┐
                         │ Store func-   │
                         │ tion code in  │
                         │ display       │
                         │ cells         │
                         └───────┬───────┘
                                 │
                               ( ○ )◄──────────────┐
                                 │                 │
                         ┌───────┴───────┐         │
                         │ Enter B with  │         │
                         │ sequential    │         │
                         │ constants     │         │
                         └───────┬───────┘         │
                                 │                 │
                         ┌───────┴───────┐         │
                         │ Store selected│         │
                         │ patterns in   │         │
                         │ test cell     │         │
                         │ plus B        │         │
                         └───────┬───────┘         │
                                 │                 │
                         ┌───────┴───────┐         │
                         │ Clear test    │         │
                         │ cell plus     │         │
                         │ B             │         │
                         └───────┬───────┘         │
                                 │                 │
                         ╭───────┴───────╮   No  ┌───────────────┐
                         │   Pattern     ├──────►│ Bit error     │
                         │   cleared     │       │ display in    │
                         ╰───────┬───────╯       │ AL            │
                                 │ Yes           └───────┬───────┘
                         ╭───────┴───────╮               │
                    No   │     All       │       ┌───────┴───────┐
             ◄───────────┤   patterns    │       │ Correct bit   │
                         │   checked     │       │ display in    │
                         ╰───────┬───────╯       │ AU            │
                                 │ Yes           └───────┬───────┘
                                 │                       │
                                 │                  ╱────┴────╲
                                 │                 │  TFDIS    │
                               ( ○ )◄──────────────┤ Error display │
                                 │                  ╲─────────╱
                         ╭───────┴───────╮
                         │     Exit      │
                         ╰───────────────╯
```

TF41:   CLEAR Y+B

SPECIFICATION SYMBOL
SB-10163

TITLE: TS41 - RIGHT SHIFT AU (5041XX)

DECK IDENTIFIER: FACT

CS-1 LABEL: TS41   KEY: 1218   IS LABEL DUPLICATE? No

PROGRAMMER: FWS modified by TLR   DATE: 8 Dec. 67

NUMBER OF L$_4$ OUTPUT INSTRUCTIONS: 29

DESCRIPTION:

This subroutine checks Right Shift AU command with its sign extension and end-off capabilities.

First the quantity 200000 is entered into AU and shifted to check the positive sign extension, that each bit can pass a one, and the end-off shift from 2^0 bit position.

Second, the quantity 400000 is entered into AU and shifted right to check negative sign extension.

Error displays are listed under alarms.

SPECIFICATION SYMBOL
SB-10163

TITLE: TS41

INPUT PARAMETERS (Listed Sequentially):

ICO2 = 200000
TS415 = 400000
TS424 = 000020

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1
BUFF2
BUFF3
BUFF4
TEX

ABNORMAL EXITS (Listed Sequentially):

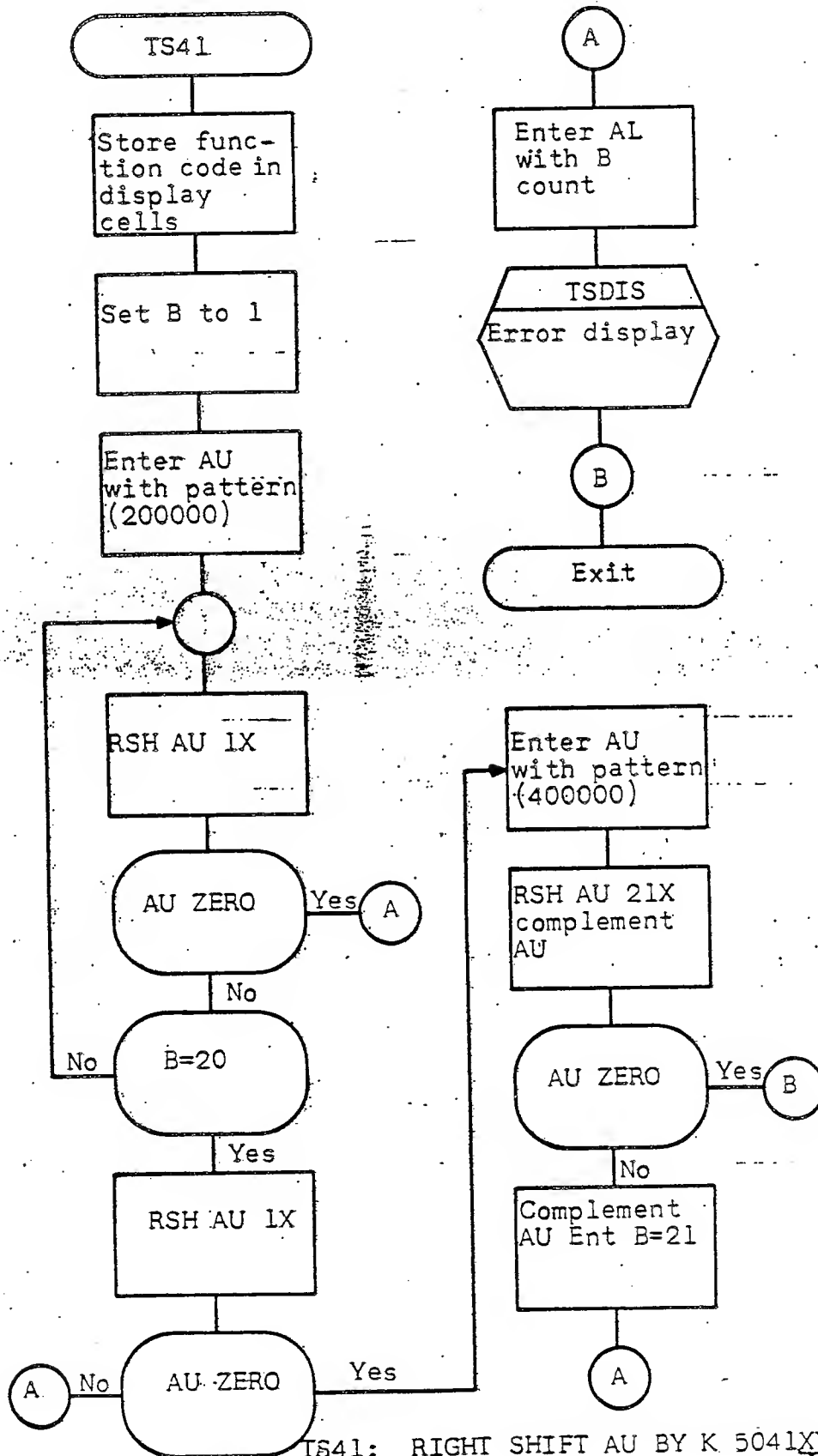### NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA - (EXEC)
TSDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY
CO/C1 = 504101
PROGRAM STOP O
AU = Error
AL = B Count (Shift Count)
    If AL = 1-20, bit was lost right shifting AL number of times
        from AU 2^{17}.
    If AL = 20, all bits should have shifted off the end and did not.
    If AL = 21, AU should equal all ones from negative sign extension.

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SPECIFICATION SYMBOL
SB-10163

ALARMS AND/OR REMARKS: (Con't)

PROGRAM SKIP 4 - Set for console error display only.
Not set for error typeout (Function Code 5041).
PROGRAM SKIP 0 - Set to recycle subroutine (TS41)
Not set to continue test

SPECIFICATION SYMBOL

SB-10163

TS41

Store func-
tion code in
display
cells

Set B to 1

Enter AU
with pattern
(200000)

○

RSH AU 1X

AU ZERO — Yes → (A)

No

B=20 — No

Yes

RSH AU 1X

(A) — No — AU ZERO — Yes →

(A)

Enter AL
with B
count

TSDIS
Error display

(B)

Exit

Enter AU
with pattern
(400000)

RSH AU 21X
complement
AU

AU ZERO — Yes → (B)

No

Complement
AU Ent B=21

(A)

TS41: RIGHT SHIFT AU BY K 5041XX

K

SPECIFICATION SYMBOL
SB-10163

TITLE: TF42 - STORE B (42xxxx)

DECK IDENTIFIER: FAGT

CS-1 LABEL: TF42   KEY: _____   IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by TLR   DATE: 8 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 56

DESCRIPTION:

This subroutine checks the Store B command. B is entered with a
test pattern then B is stored in a test cell using a STRB command.
Validity is checked by entering AL with the contents of the test
cell, AU with the test pattern, and comparing AL and an associated
test pattern. If correct, the next test pattern is entered into
B and the sequence is repeated until all patterns have been checked.
An exit is then made to the executive routine (COMA). If an error
is detected by any of the validity checks an exit is made to the
display subroutine. AU will contain the correct pattern, AL the
incorrect pattern and , if PROGRAM STOP O is set, CO the function
code, and the error may be evaluated. Upon return to this sub-
routine (TF42) an exit is made to the executive routine (COMA) to
check for continuing the test or recycling this subroutine (TF42).

SPECIFICATION SYMBOL
SB-10163

TITLE: TF42

INPUT PARAMETERS (Listed Sequentially):

COMA		TEST PATTERNS			
		TPAT	777777	TPAT5	007777
		TPAT+1	777777	TPAT5+1	007777
		TPAT1	000000	TPAT6	707070
		TPAT2	252525	TPAT6+1	707070
		TPAT2+1	252525	TPAT7	070707
		TPAT3	525252	TPAT7+1	070707
		TPAT3+1	525252	TPAR	TEST CELL
		TPAT4	770000		
		TPAT4+1	770000		

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1
BUFF2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA - (EXEC)
TFDIS - Error Display

SYSTEM DATA REFERENCES:
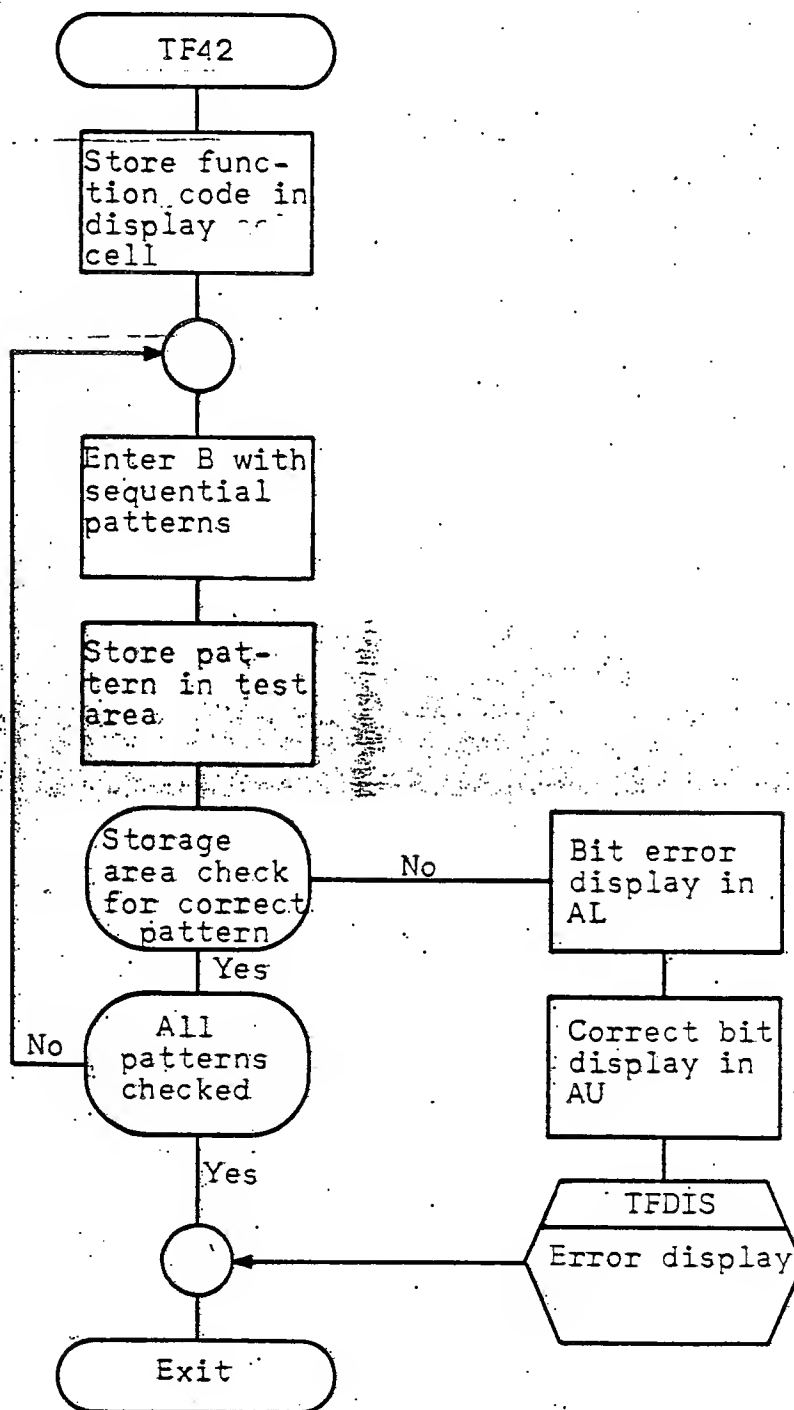
ALARMS AND/OR REMARKS:

ERROR DISPLAY
PROGRAM STOP 0 - Correct information in AU
                 Incorrect information in AL
                 Function code (42xxxx) in CO
PROGRAM SKIP 4 - Set for console error display only
                 Not set for error typeout (Function Code)
PROGRAM SKIP 0 - Not set to continue test
                 Set to recycle subroutine (TF42)

SPECIFICATION SYMBOL
SB-10163

```
            ┌─────────────────┐
            │      TF42        │
            └─────────────────┘
                     │
            ┌─────────────────┐
            │ Store func-     │
            │ tion code in    │
            │ display         │
            │ cell            │
            └─────────────────┘
                     │
                    (○)
                     │
            ┌─────────────────┐
            │ Enter B with    │
            │ sequential      │
            │ patterns        │
            └─────────────────┘
                     │
            ┌─────────────────┐
            │ Store pat-      │
            │ tern in test    │
            │ area            │
            └─────────────────┘
                     │
            ╱ Storage  ╲        No      ┌──────────────┐
           ╱ area check ╲───────────────│ Bit error    │
           ╲ for correct ╱              │ display in   │
            ╲  pattern  ╱               │ AL           │
                │ Yes                   └──────────────┘
            ╱ All    ╲     No                  │
      ─────╱ patterns ╲              ┌──────────────┐
           ╲ checked  ╱              │ Correct bit  │
                │                    │ display in   │
                │ Yes               │ AU           │
                                    └──────────────┘
                                           │
                                    ╱  TFDIS       ╲
                   (○)◄─────────────  Error display ╲
                    │                 ╲             ╱
            ┌─────────────────┐
            │      Exit        │
            └─────────────────┘
```

TF42:   STORE B

SPECIFICATION SYMBOL.
SB-10163

TITLE: TS42 - RIGHT SHIFT AL (5043XX)

DECK IDENTIFIER: FACT

CS-1 LABEL: TS42   KEY: _____   IS LABEL DUPLICATE? No

PROGRAMMER: FWS modified by TLR   DATE: 8 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 30

DESCRIPTION:

This subroutine checks Right Shift AL command with its sign
extension and end off capabilities.

First the quantity 200000 is entered into AL and shifted right
to check the positive sign extension, that each bit can pass a
one, and the end-off shift from the 2^0 bit position.

Second, the quantity 400000 is entered into AL and shifted right
to check negative sign extension.

Error displays are listed under alarms.

SPECIFICATION SYMBOL
SB-10163

TITLE: TS42

INPUT PARAMETERS (Listed Sequentially):

TC02 = 200000
TS424 = 000020
TS415 = 400000

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1
BUFF2
BUFF3
BUFF4
TEX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA - (EXEC)
TSDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:
ERROR DISPLAY
PROGRAM STOP O.
AL=Error
AU = B Count (Shift Count)
    If AU = 1-20, bit was lost right shifting AU number of times
        from AL 2^{17}.
If AU = 20, all bits should have shifted off the end and did not.
If AU = 21, AL should be all ones from negative sign extension.
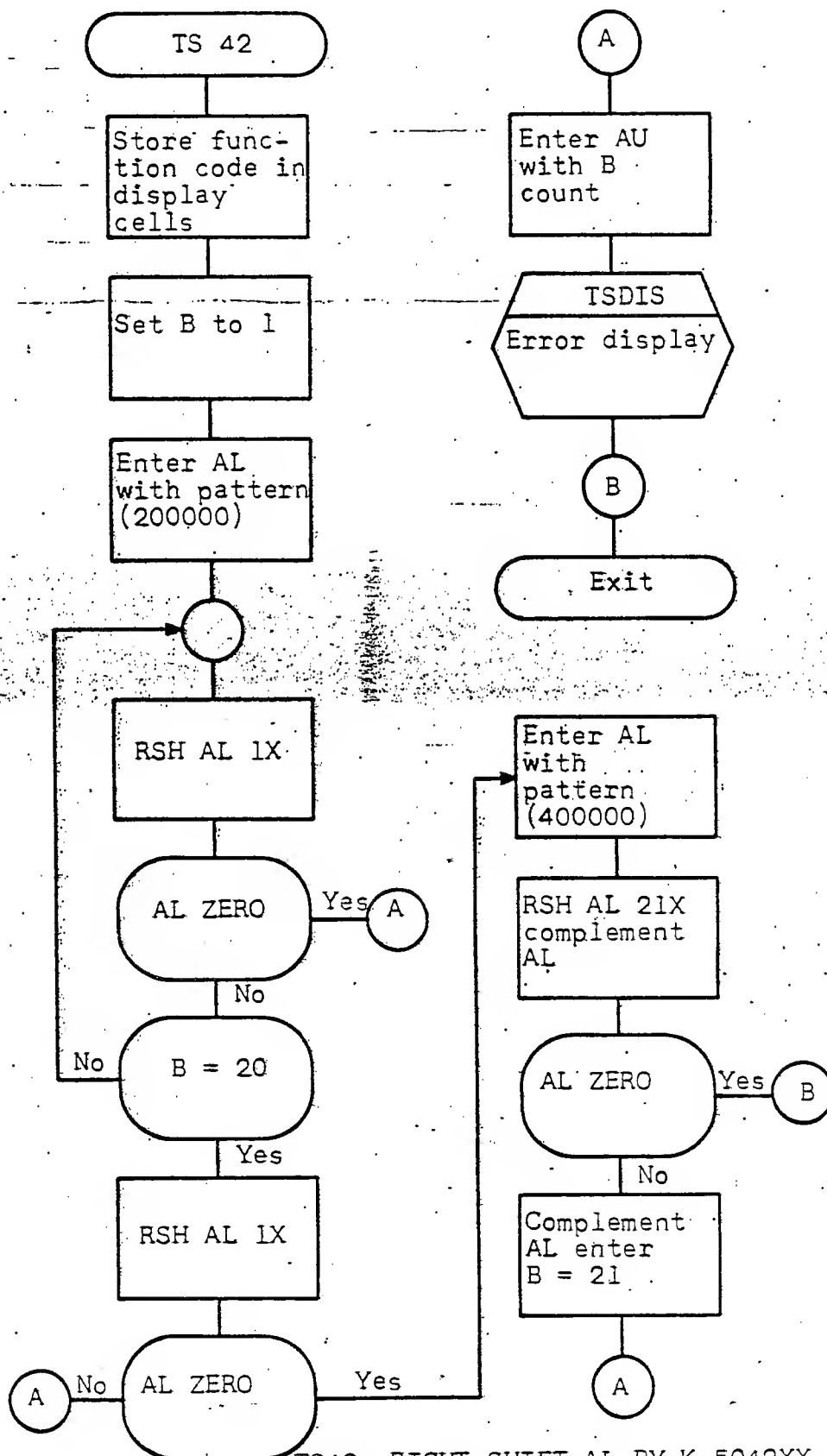
ALARMS AND/OR REMARKS: (Con't)

PROGRAM SKIP 4 - Set for console error display only
                 Not set for error typeout (Function Code 5042)
PROGRAM SKIP 0 - Set to recycle subroutine (TS42)
                 Not set to continue test

```
        ( TS 42 )                          ( A )
            │                                │
   ┌────────────────┐              ┌────────────────┐
   │ Store func-    │              │ Enter AU       │
   │ tion code in   │              │ with B         │
   │ display        │              │ count          │
   │ cells          │              └────────────────┘
   └────────────────┘                       │
            │                     ╱────────────────╲
   ┌────────────────┐            │     TSDIS         │
   │ Set B to 1     │            ├───────────────────┤
   │                │            │ Error display     │
   └────────────────┘             ╲─────────────────╱
            │                                │
   ┌────────────────┐                      ( B )
   │ Enter AL       │                        │
   │ with pattern   │                     ( Exit )
   │ (200000)       │
   └────────────────┘
            │
          ( C )
            │
   ┌────────────────┐              ┌────────────────┐
   │ RSH AL 1X      │              │ Enter AL       │
   │                │              │ with           │
   └────────────────┘              │ pattern        │
            │                      │ (400000)       │
      ( AL ZERO ) ──Yes──( A )     └────────────────┘
            │                               │
           No                      ┌────────────────┐
            │                       │ RSH AL 21X     │
   ( B = 20 ) ──No                  │ complement     │
            │                       │ AL             │
           Yes                      └────────────────┘
            │                               │
   ┌────────────────┐              ( AL ZERO ) ──Yes──( B )
   │ RSH AL 1X      │                       │
   │                │                      No
   └────────────────┘               ┌────────────────┐
            │                        │ Complement     │
 ( A )─No─( AL ZERO )──Yes           │ AL enter       │
                                     │ B = 21         │
                                     └────────────────┘
                                             │
                                           ( A )
```

TS42: RIGHT SHIFT AL BY K 5042XX

| SPECIFICATION SYMBOL |
| SB-10163 |

TITLE: TF43 - STORE B MODIFIED BY B (43xxxx)

DECK IDENTIFIER: FAGT

CS-1 LABEL: TF43   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by TLR   DATE: 8 Dec. 67

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 50

DESCRIPTION:

This subroutine checks the Store B Modified By B command. B is entered with a test-pattern constant and STRBB (test cell) command is executed. Validity is checked by entering AU with the test pattern AL with the contents of the test cell, and AL is then compared to the test pattern. If correct, the next test-pattern constant is entered into B and the sequence repeated until all patterns have been checked. An exit is then made to the executive routine (COMA). If an error is detected by any of the validity checks. AU will contain the correct pattern, AL the incorrect pattern, and an exit will be made to the display subroutine. If PROGRAM STOP O is set, CO will contain the function code and the error may be evaluated. Upon return to this subroutine (TF43) an exit will be made to the executive routine (COMA) to check for continuing the test or re-cycling this subroutine (TF43).

SPECIFICATION SYMBOL
SB-10163

TITLE:___ TF43

INPUT PARAMETERS (Listed Sequentially):

COMA   TEST PATTERNS
                    TPAT1   000000
                    TPAB1   000001
                    TPAB1+1   777776
                    TPAS4   000002
                    TPAS5   000004
                    TPAS6   000007
                    TPAS7   777775
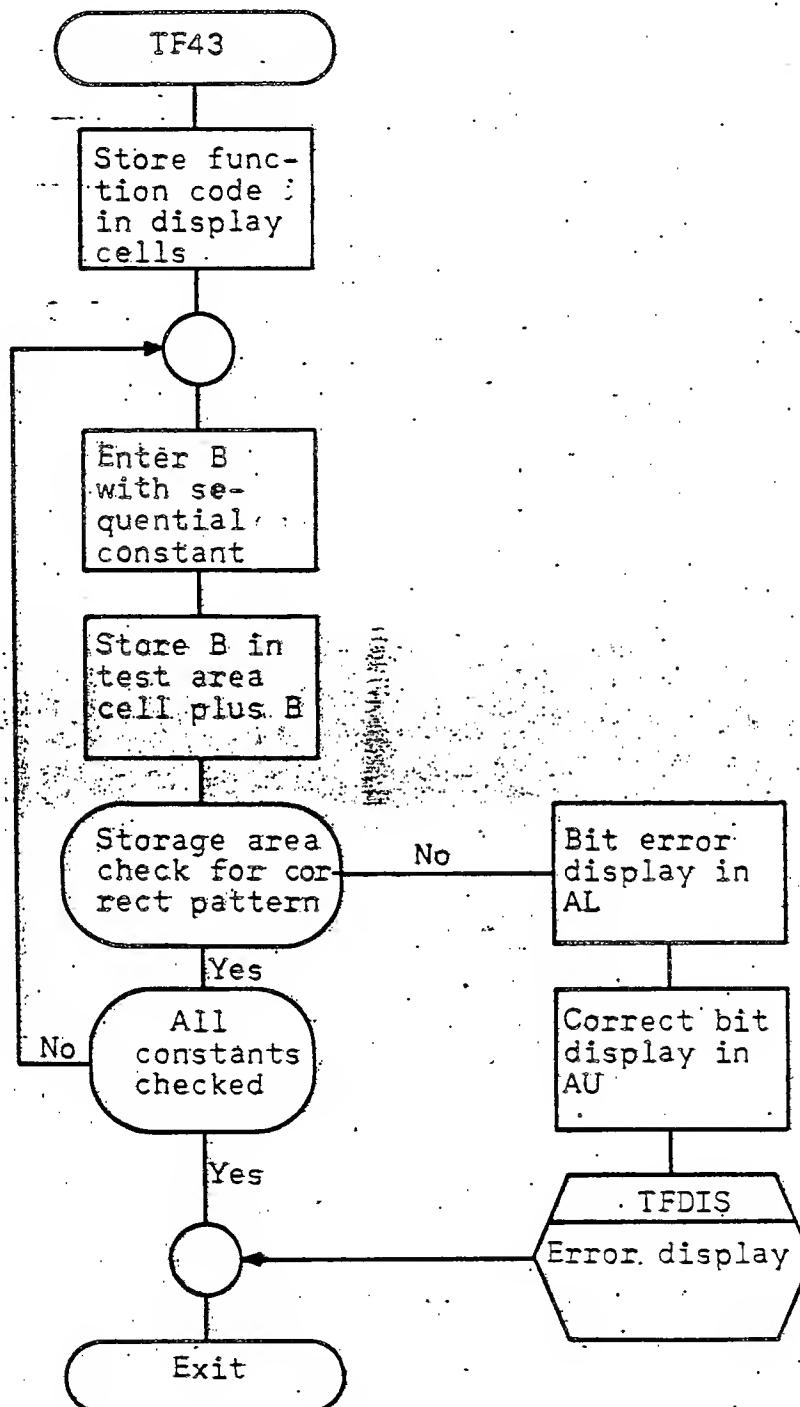   TPAR   TEST CELLS

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1
BUFF2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA - (EXEC)
TFDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY
PROGRAM STOP 0 - Correct information in AU
                 Incorrect information in AL
                 Function code in CO
PROGRAM SKIP 4 - Set for console error display only
                 Not set for error typeout (Function Code 43)
PROGRAM SKIP 0 - Not set to continue test
                 Set to recycle subroutine (TF43)

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SPECIFICATION SYMBOL
SB-10163

```
              ╭─────────╮
              │  TF43   │
              ╰────┬────╯
                   │
          ┌────────┴────────┐
          │ Store func-     │
          │ tion code       │
          │ in display      │
          │ cells           │
          └────────┬────────┘
                   │
                  ( )◄──────────────┐
                   │                │
          ┌────────┴────────┐       │
          │ Enter B         │       │
          │ with se-        │       │
          │ quential        │       │
          │ constant        │       │
          └────────┬────────┘       │
                   │                │
          ┌────────┴────────┐       │
          │ Store B in      │       │
          │ test area       │       │
          │ cell plus B     │       │
          └────────┬────────┘       │
                   │                │
          ╭────────┴────────╮  No   ┌──────────────┐
          │ Storage area    ├──────►│ Bit error    │
          │ check for cor-  │       │ display in   │
          │ rect pattern    │       │ AL           │
          ╰────────┬────────╯       └──────┬───────┘
                   │ Yes                    │
          ╭────────┴────────╮       ┌──────┴───────┐
    No    │ All             │       │ Correct bit  │
  ┌───────┤ constants       │       │ display in   │
  │       │ checked         │       │ AU           │
  │       ╰────────┬────────╯       └──────┬───────┘
  │                │ Yes                    │
  │               ( )◄──────────────╱ TFDIS ╲
  │                │                ╲ Error display ╱
  │       ╭────────┴────────╮
  │       │     Exit        │
  │       ╰─────────────────╯
```

TF43:   STORE B MODIFIED BY B

SPECIFICATION SYMBOL
SB-10163

TITLE: TS43 - RIGHT SHIFT A (5043XX)

DECK IDENTIFIER: FACT

CS-1 LABEL: TS43   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: FWS modified by TLR   DATE: 8 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 40

DESCRIPTION:

This subroutine checks Right Shift A command with its sign extension and end-off capabilities (RSHA command).

First the quantity 200000 is entered into AU and shifted right to check the positive sign extension, that each bit can pass a one, and the AU 2^0 to AL 2^{17} transfer. The bit is then shifted through AL to check the positive sign extension, that each bit can pass a one, and the end-off shift from 2^0 of this register.

Second, the quantity 400000 is entered into AU and shifted right to check the negative sign extension of both registers.

Error displays are listed under alarms.

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PROGRAM DATA PAGE (Cont)

SPECIFICATION SYMBOL
SB-10163

TITLE: TS43

INPUT PARAMETERS (Listed Sequentially):

```
TC02 = 200000
TS415 = 400000
TS424 = 000020
TSR430 = 000021
TPAT = 777777
```

OUTPUT PARAMETERS (Listed Sequentially):

```
BUFF1
BUFF2
BUFF3
BUFF4
TFX
```

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

```
COMA - (EXEC)
TSDIS - Error Display
```

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

```
ERROR DISPLAY
PROGRAM STOP 0
CO/C1 = 504301
AL = B Count, if B less than 21
AU = B Count, if B more than 20
```

To determine lost bit, use B Count shifting right from AU 2^{17}, or AL and AU should equal all ones for right shift with negative sign extension.

A-1975

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ALARMS AND/OR REMARKS: (Con't.)

PROGRAM SKIP 4 - Set for console error display only
                 Not set for error typeout (Function Code 5043)
PROGRAM SKIP 0 - Set to recycle subroutine (TS43)
                 Not set to continue test

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SPECIFICATION SHEET

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SPECIFICATION SYMBOL
SB-10163

TS43

Store func-
tion code in
display
cells

Set B to 1
Clear AL

Enter AU
with pattern
(200000)

RSH A 1X

AU ZERO — Yes — A

No

B = 20 — No

Yes

RSH A 1X

A

Enter AL
with B
count

D

TSDIS
Error display

E

Exit

AU ZERO — No — A

Yes

Clear B

C

TS43: RIGHT SHIFT A BY K 5043XX
                                  ――
                                   K
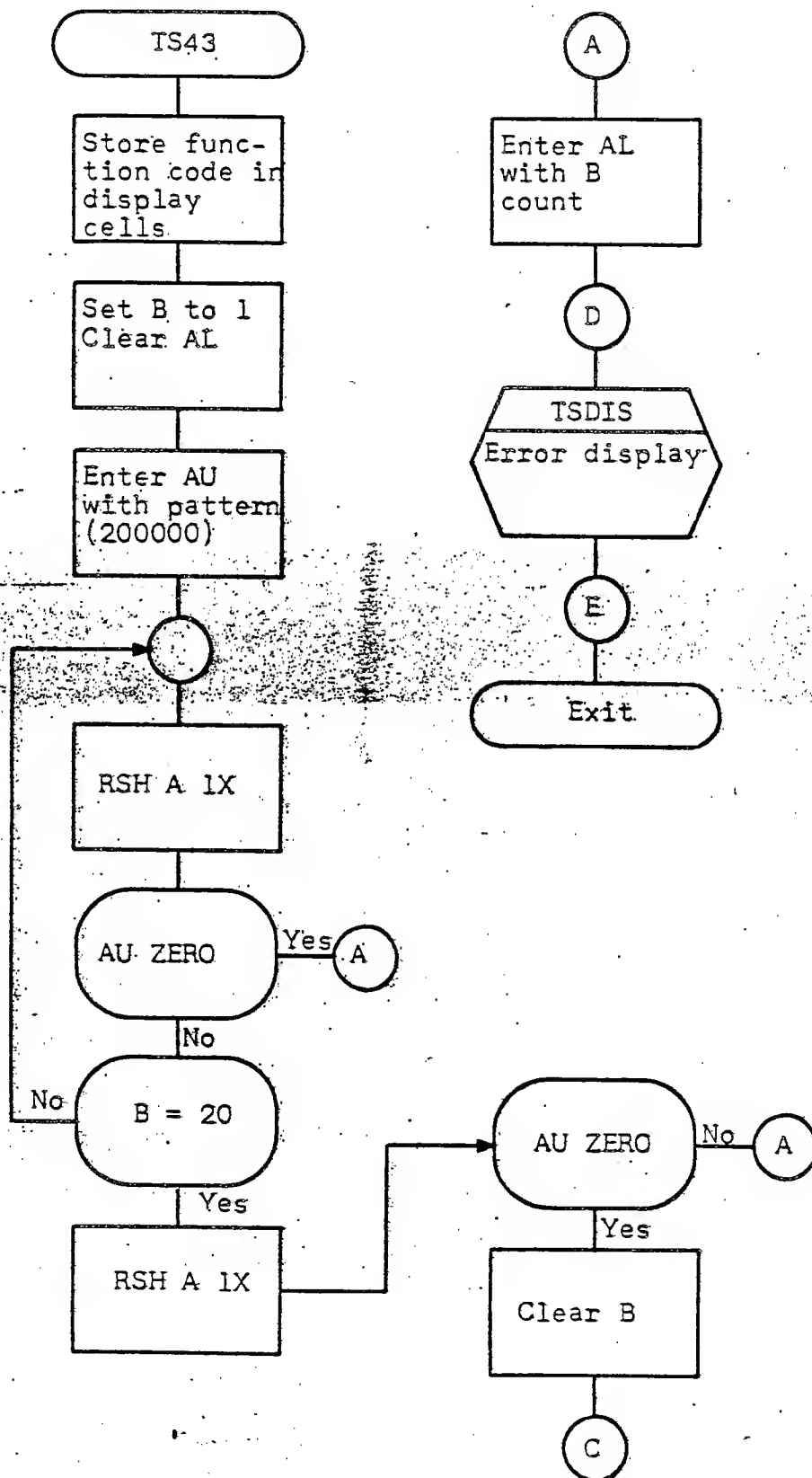
SPECIFICATION SYMBOL
SB-10163
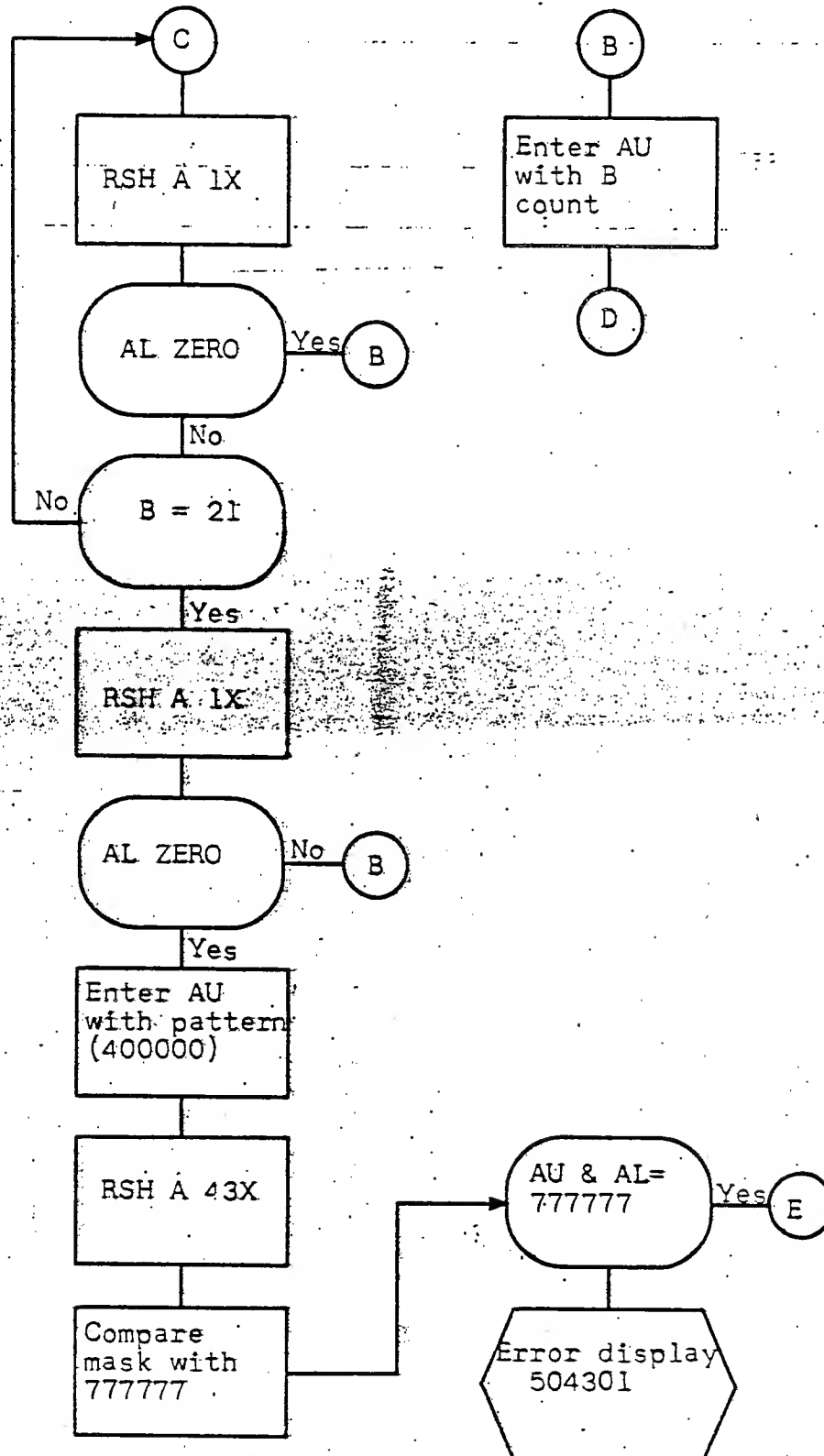
TS43:   RIGHT SHIFT A BY K 5043XX

$$\frac{}{K}$$

PROGRAM DATA PAGE

	SPECIFICATION SYMBOL
	SB-10163

TITLE: TF44 - STORE A LOWER (44xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF44   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by   DATE: 8 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 50

DESCRIPTION:

This subroutine checks the Store A Lower command. AL is entered
with a test-pattern constant them AL is stored in a test cell using
a STRAL command. Validity is checked by entering AU with the con-
tents of the test cell and executing a compare mask. If correct,
A is equal to zero, the next, test-pattern constant is entered into
AL and the sequence repeated until all patterns have been checked.
An exit is then made to the executive routine (COMA). If an error
is detected by any of the validity checks a left shift A is executed
and AU will contain the correct pattern, AL the incorrect pattern,
and an exit is made to the display subroutine. With PROGRAM STOP O
set, CO will contain the function code, and the error may be evaluated.
Upon return to this subroutine (TF44) an exit is made to the execu-
tive routine (COMA) to check for continuing the test or recycling
this subroutine (TF44).

A-1974

SPECIFICATION SYMBOL
SB-10163

TITLE: ___ TF44 ___

INPUT PARAMETERS (Listed Sequentially):

COMA   TEST PATTERNS

TPAT	777777
TPAT1	000000
TPAT2	252525
TPAT3	525252
TPAT4	770000
TPAT5	007777
TPAT6	707070
TPAT7	070707
TCO1	777777

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1
BUFF2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA - (EXEC)
TFDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY
PROGRAM STOP 0 - Correct information in AU
             Incorrect information in AL
             Function code (44xxxx) in CO
PROGRAM SKIP 4 - Set for console error display only
             Not set for error typeout (Function Code 44)
PROGRAM SKIP 0 - Not set to continue test
             Set to recycle subroutine (TF44)
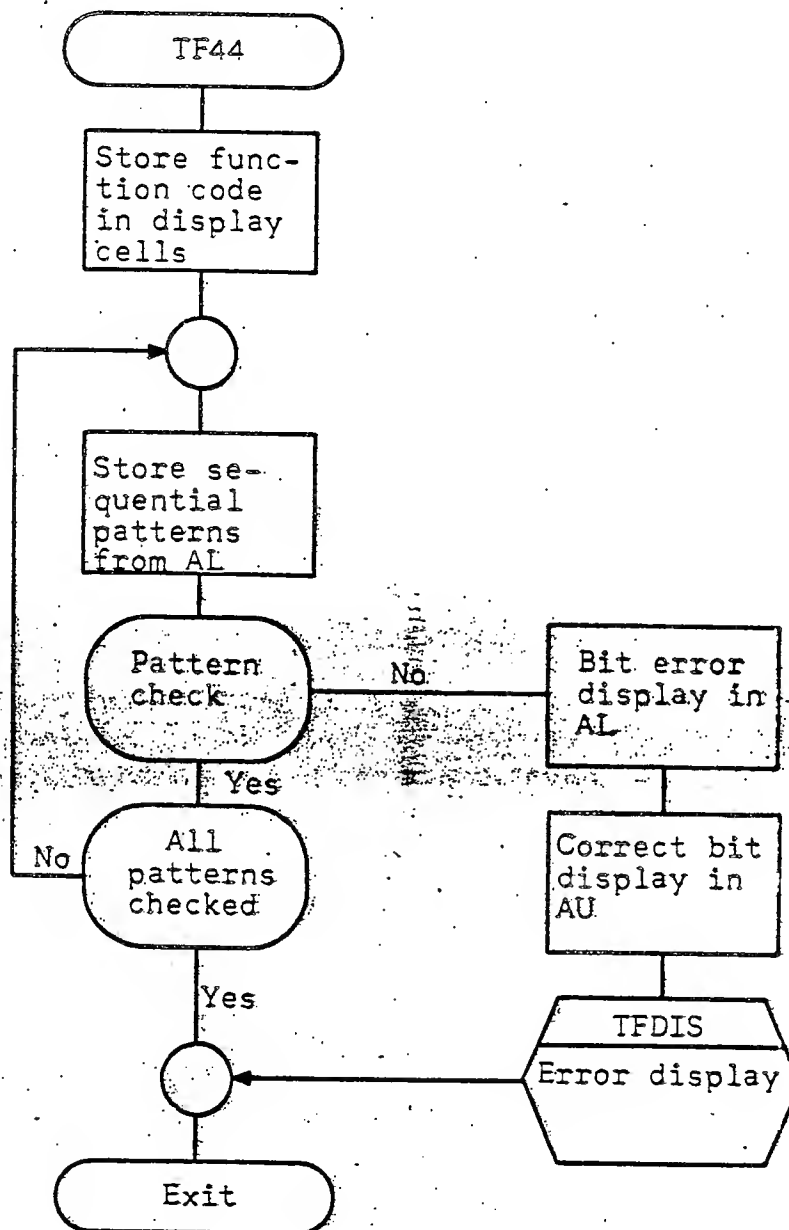
SPECIFICATION SYMBOL
SB-10163

```
          ┌──────────────┐
          │     TF44     │
          └──────┬───────┘
          ┌──────┴───────┐
          │ Store func-  │
          │ tion code    │
          │ in display   │
          │ cells        │
          └──────┬───────┘
             ┌───●───┐
             │       │
          ┌──┴───────┴──┐
          │ Store se-   │
          │ quential    │
          │ patterns    │
          │ from AL     │
          └──────┬──────┘
          ┌──────┴──────┐        ┌──────────────┐
          │  Pattern    │  No    │ Bit error    │
          │  check      │────────│ display in   │
          └──────┬──────┘        │ AL           │
               Yes               └──────┬───────┘
          ┌──────┴──────┐        ┌──────┴───────┐
    No    │    All      │        │ Correct bit  │
  ────────│  patterns   │        │ display in   │
          │  checked    │        │ AU           │
          └──────┬──────┘        └──────┬───────┘
               Yes                  ┌───┴────┐
               │                    │ TFDIS  │
             ┌─●─┐◄─────────────────┤ Error  │
             │   │                  │display │
          ┌──┴───┴──┐               └────────┘
          │  Exit   │
          └─────────┘
```

TF44:   STORE A LOWER

SPECIFICATION SYMBOL

SB-10163

TITLE: TS44 - SCALE FACTOR (5044XX)

DECK IDENTIFIER: FACT

CS-1 LABEL: TS44   KEY: 1218   IS LABEL DUPLICATE? No

PROGRAMMER: FWS modified by TLR   DATE: 8 Dec. 67

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 53

DESCRIPTION:

This subroutine checks Scale Factor of the A Register. Both positive and negative constants are used and all normalizing counts from 1 to 41 are checked.

Error displays are listed under alarms.

SPECIFICATION SYMBOL
SB-10163

TITLE: TS44

INPUT PARAMETERS (Listed Sequentially):

```
TPAT1 = 000000
TPAB1 = 000001
TCO2  = 200000
TPAT  = 777777
TS447 = 000041
TPAB  = 777776
TSR44 = 577777
```

OUTPUT PARAMETERS (Listed Sequentially):

```
BUFF1
BUFF2
TFX
TSH   = AU PATTERN STORE
TSCOT = AL PATTERN STORE
TS446 = B COUNT STORE
```

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

```
COMA - (EXEC)
TSDIS - Error Display
```

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

```
ERROR DISPLAY
PROGRAM STOP O
CO/C1 = 504442
AU and AL equal normalized positive pattern
   If AU = 200000, AL should be cleared.
   If AL = 200000, AU should = 200000.
AU and AL equal normalized negative pattern
   If AU = 577777, AL should be all ones.
   If AL = 577777, AU should = 577777
```

A-1975

ALARMS AND/OR REMARKS: (Con't)

PROGRAM SKIP 4 - Set for console error display only
                    Not set for error typeout (Function Code 5044)
PROGRAM SKIP 0 - Set to recycle subroutine (TS44)
   Not set to continue test
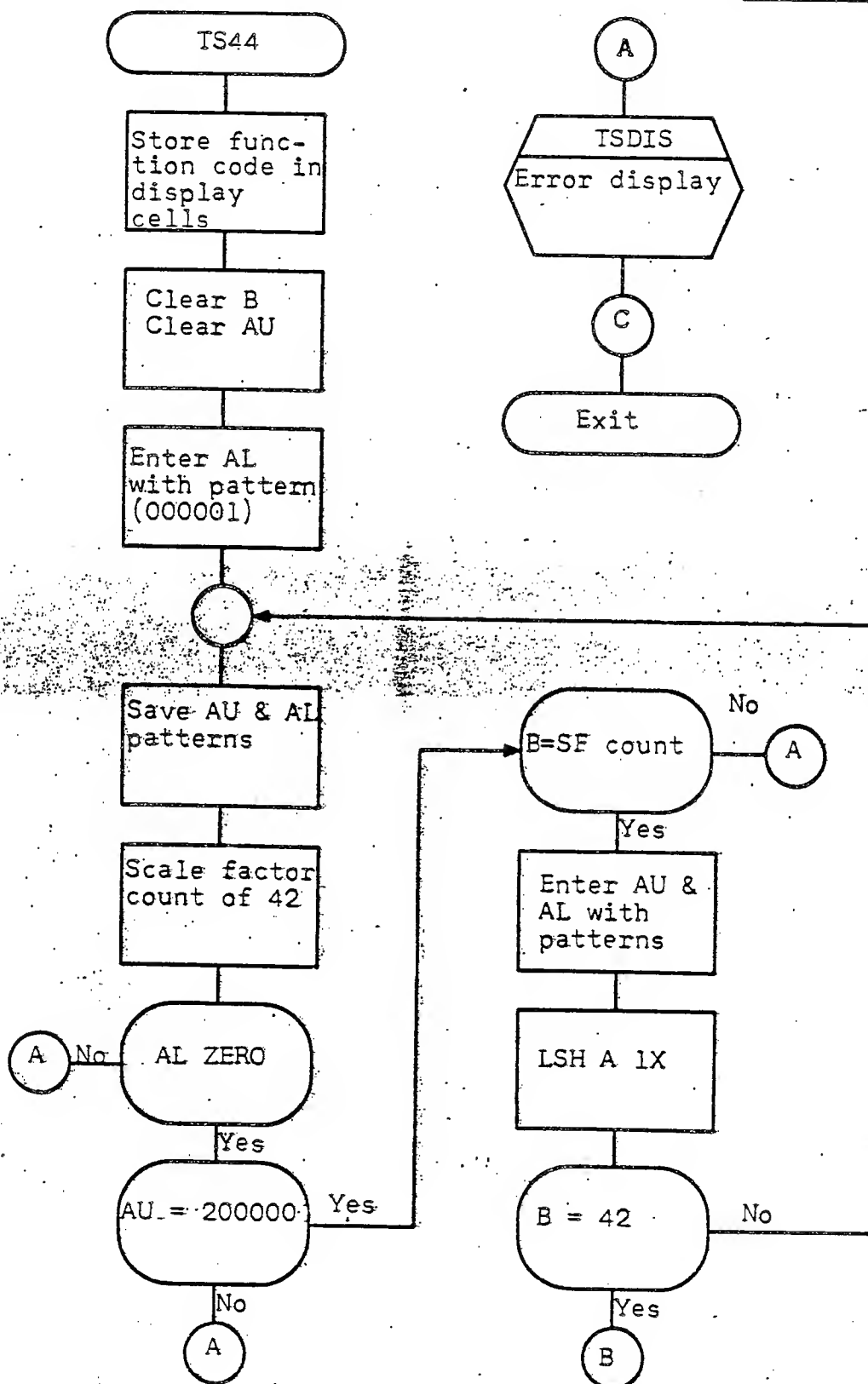
```
        ( TS44 )                          ( A )
           |                               |
  +-----------------+              /---------------\
  | Store func-     |              \    TSDIS      /
  | tion code in    |               \ Error display/
  | display         |               /             \
  | cells           |               \-------------/
  +-----------------+                     |
           |                            ( C )
  +-----------------+                     |
  | Clear B         |                 (  Exit  )
  | Clear AU        |
  +-----------------+
           |
  +-----------------+
  | Enter AL        |
  | with pattern    |
  | (000001)        |
  +-----------------+
           |
          ( O )<-------------------------------------+
           |                                         |
  +-----------------+                                |
  | Save AU & AL    |          No                    |
  | patterns        |      +------( B=SF count )--( A )
  +-----------------+      |            |             
           |              |           Yes            
  +-----------------+      |    +-----------------+   
  | Scale factor    |      |    | Enter AU &      |   
  | count of 42     |      |    | AL with         |   
  +-----------------+      |    | patterns        |   
           |              |    +-----------------+   
           |              |            |             
  ( A )--No--( AL ZERO )   |    +-----------------+   
              |           |    |   LSH A 1X      |   
            Yes           |    +-----------------+   
              |           |            |             
     ( AU = 200000 )-Yes--+    (  B = 42  )---No-----+
              |                       |
             No                      Yes
              |                       |
            ( A )                   ( B )
```

TS44: SCALE FACTOR BY MAXIMUM K   5044XX
K

TS44: SCALE FACTOR BY MAXIMUM K 5044XX
K

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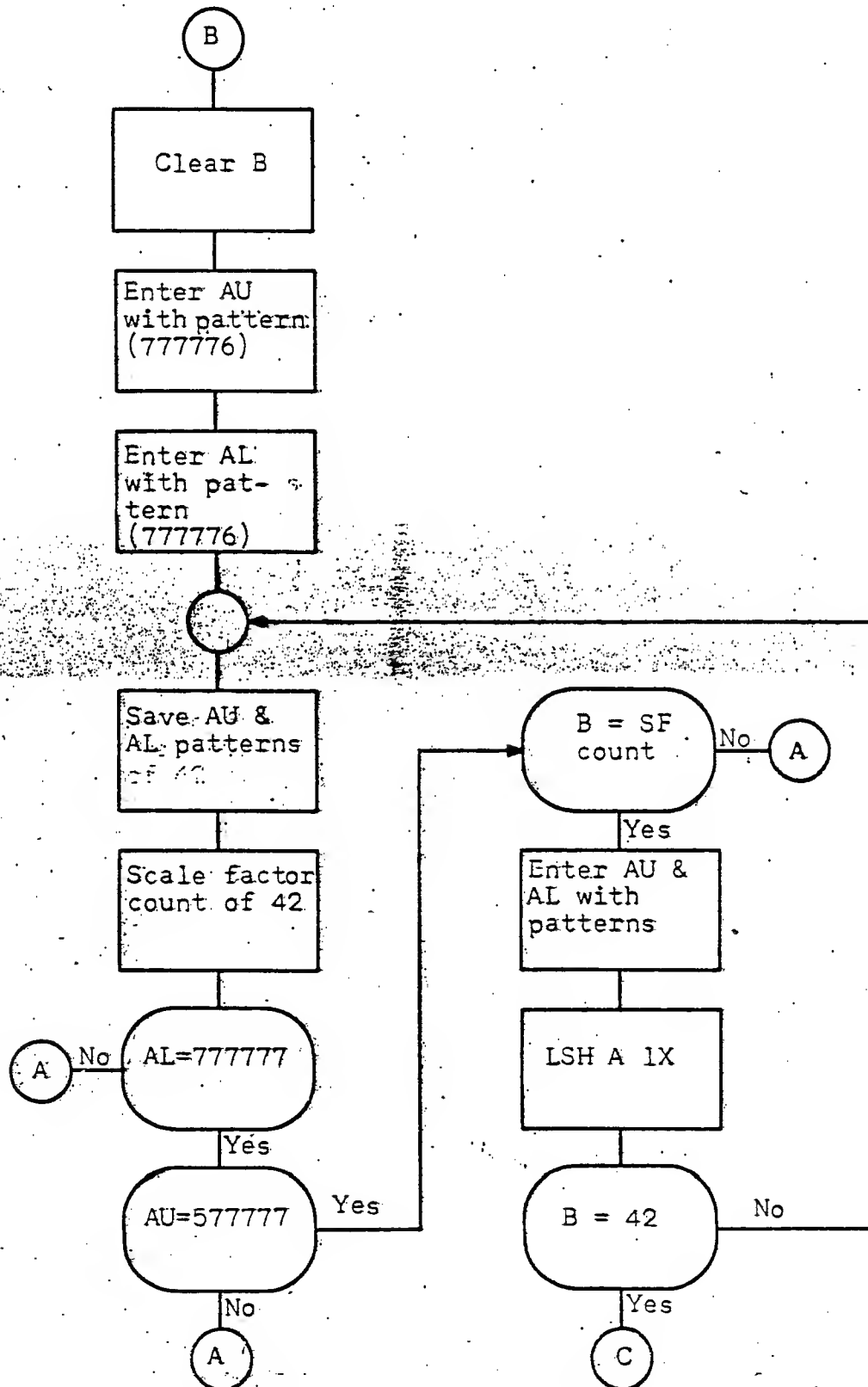
PROGRAM DATA PAGE

SPECIFICATION SYMBOL
SB-10163

TITLE: TF45 - STORE A LOWER MODIFIED BY B (45xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF45   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by TLR   DATE: 8 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: _____

DESCRIPTION:

This subroutine checks the Store A Lower Modified By B command. B is
entered with a constant and AL with a test-pattern constant. Then
a STRALB command is executed. Validity is checked by entering AU
with the contents of the test cell and executing a compare mask.
If correct, A is equal to zero, the next constant is entered into
B and the cycle is repeated until all test patterns have been checked.
An exit is then made to the executive routine (COMA). If an error
is detected by any of the validity checks, a left shift A is executed
and AU will contain the correct pattern, AL the incorrect pattern.
An exit is then made to the display subroutine where, with PROGRAM
STOP 0 set, CO will contain the function code and the error may be
evaluated. Upon return to this subroutine (TF45) an exit is made
to the executive routine (COMA) to check for continuing the test or
recycling this subroutine (TF45).

A-1974

	SPECIFICATION SYMBOL
	SB-10163

TITLE:____TF45_____

INPUT PARAMETERS (Listed Sequentially):

COMA   TEST PATTERNS

	TPAT	777777	TPAR	TEST CELLS
	TPAT1	000000		
	TPAT2	252525		
	TPAT3	525252		
	TPAT4	770000		
	TPAT5	007777		
	TPAT6	707070		
	TPAT7	070707		
	TCO1	777777		

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1
BUFF2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA - (EXEC)
TFDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY
PROGRAM STOP 0 - Correct information in AU
                 Incorrect information in AL
                 Function code (45xxxx) in CO
PROGRAM SKIP 4 - Set for console error display only
                 Not set for error typeout (Function Code 45)
PROGRAM SKIP 0 - Set to continue test
                 Not set to recycle subroutine (TF45)

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SPECIFICATION SHEET

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SPECIFICATION SYMBOL
SB-10163.

```
                    ( TF45 )
                       |
              +-----------------+
              | Store func-     |
              | tion code       |
              | in display      |
              | cells           |
              +-----------------+
                       |
                      ( )
                       |
              +-----------------+
              | Enter B with    |
              | selected con-   |
              | stants          |
              |                 |
              +-----------------+
                       |
              +-----------------+
              | Store sequen-   |
              | tial pattern    |
              | from AL in      |
              | test area       |
              | plus B          |
              +-----------------+
                       |
              (  Storage  )  No    +-----------------+
              (  area for )------->| Bit error       |
              ( proper pat-)       | display in      |
              (    tern   )        | AL              |
                    |Yes           +-----------------+
              (    All   ) No               |
              ( patterns  )        +-----------------+
              ( checked  )         | Correct bit     |
                    |              | display in      |
                    |Yes          | AL              |
                    |             +-----------------+
                   ( )                     |
                    |<--------- / TFDIS        /
                    |           / Error display /
              (  Exit  )
```

TF45:   STORE AL MODIFIED BY B

SPECIFICATION SYMBOL
SB-10163

TITLE: TS45 - LEFT SHIFT AU (5045XX)

DECK IDENTIFIER: FACT

CS-1 LABEL: TS45   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: FWS modified by TLR   DATE: 8 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 30

DESCRIPTION:

This subroutine checks Left Shift AU command with its end around capabilities.

First, the quantity 000001 is entered into AU and left shifted one bit at a time until it should be in bit 2^{17} position. AU is then tested for its avility to pass a one without picking up a bit.

Secondly, one more left shift is executed to check the end around feature from bit 2^{17} to bit 2^0.

Error displays are listed under alarms.

SPECIFICATION SYMBOL
SB-10163

TITLE: _____ TS45 _____

INPUT PARAMETERS (Listed Sequentially):

TPAB1 = 000001
TSR430 = 21
TS455 = 400000
TCO1 = 777777

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1
BUFF2
BUFF3
BUFF4
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA — (EXEC)
TSDIS — Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY
PROGRAM STOP 0
CO/C1 - 504501
AU = Error

If AL = 1=21, bit was lost while shifting that count from 2^0.
If AL = 400000, AU should equal 400000 unless bits picked up.
If AL = 000001, AU should equal 000001 unless end around failed.

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SPECIFICATION SHEET

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SPECIFICATION SYMBOL

SB-10163

ALARMS AND/OR REMARKS: (Con't)

PROGRAM SKIP 4 - Set for console error display only
                 Not set for error typeout (Function Code 5045)
PROGRAM SKIP 0 - Set to recycle subroutine (TS45)
                 Not set to continue test.

SPECIFICATION SYMBOL
SB-10163

```
        ( TS45 )                              ( A )
           |                                    |
   +----------------+                   +----------------+
   |     Store      |                   |     Enter      |
   |    function    |                   |    AL with     |
   | code in dis-   |                   |  B or pat-     |
   |   play cells   |                   |     tern       |
   +----------------+                   +----------------+
           |                                    |
   +----------------+                   /    TSDIS     \
   |  Set B to 1    |                   /               \
   |    Clear       |                  (     Error       )
   |     AL         |                   \   Display     /
   +----------------+                    \             /
           |                                    |
   +----------------+                         ( B )
   |   Enter AU     |
   |    with        |
   |   pattern      |
   |   (000001)     |
   +----------------+
           |
          (O)<-----------+
           |             |
   +----------------+    |
   |     LSH        |    |
   |     AU         |    |
   |     1X         |    |
   +----------------+    |
           |             |
        /  AU  \  Yes   ( A )
       (  ZERO  )------
        \      /
           | No
        /       \        Yes    +----------------+
   No  (  B = 21 )-------------->|     LSH        |
   |    \       /                |     AU         |
   |       |                     |     1X         |
   |      Yes                    +----------------+
   |    /       \                       |
  ( A )( AU =    )                   /  AU =   \  No
   No  ( 400000  )------------------( 000001   )----( A )
        \       /                    \        /
                                         |
                                        Yes
                                       ( B )
```
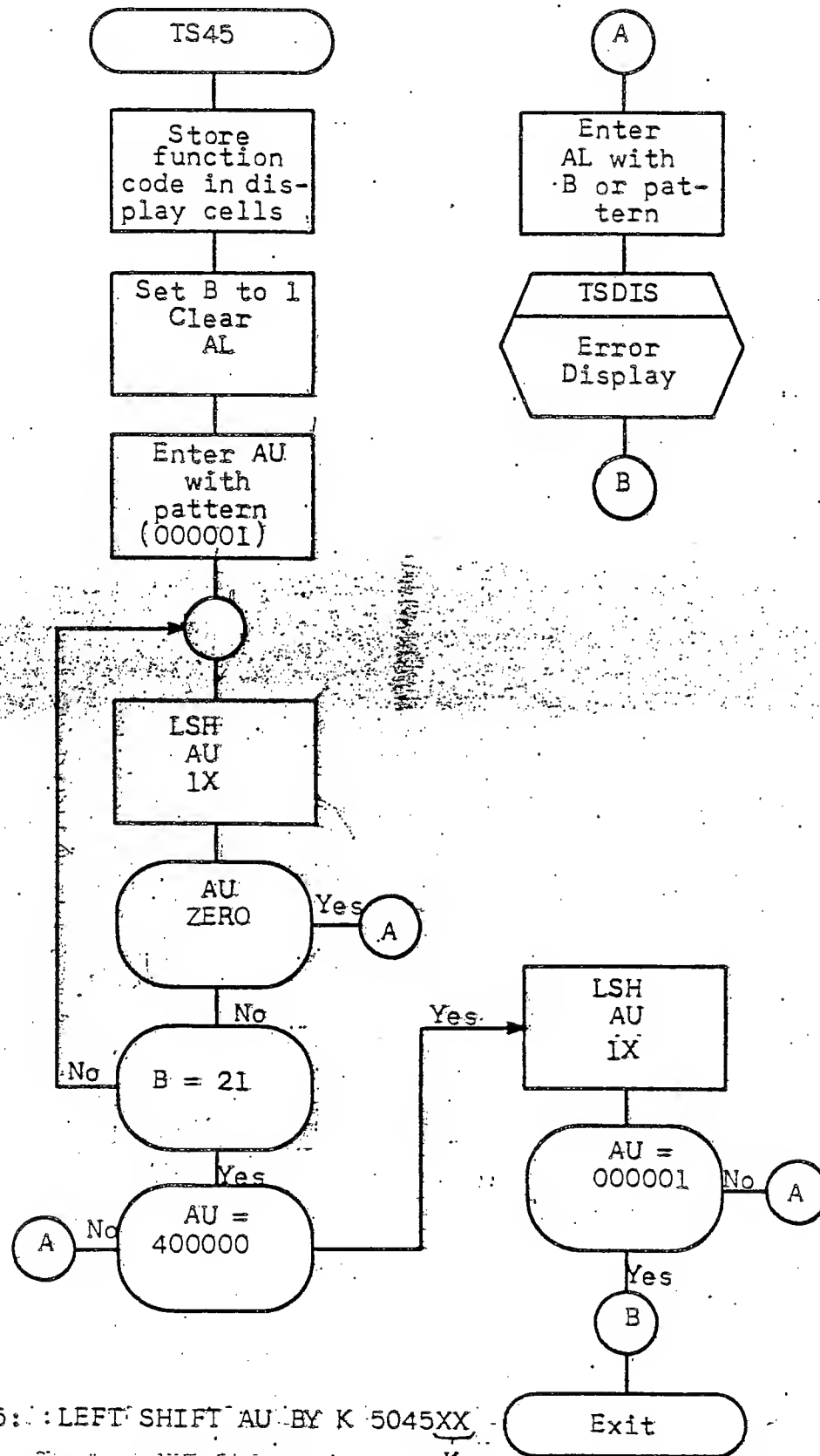
TS45: : LEFT SHIFT AU BY K 5045XX
                                 K

(Exit)

SPECIFICATION SYMBOL

SB-10163

TITLE: TF46 - STORE A UPPER (46xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF46   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by TLR   DATE: 8 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 49

DESCRIPTION:

This subroutine checks the Store A Upper command. AU is entered
with a test pattern and stored in a test cell using a STRAU command.
Validity is then checked by entering AL with the contents of the
test cell and comparing AL with the test pattern. If correct,
the next pattern is entered into AU and the cycle is repeated until
all patterns have been checked. An exit is then made to the
executive routine (COMA). If an error is detected by any of the
validity checks, AU will contain the correct pattern, AL the in-
correct pattern, and an exit is made to the display subroutine.
With PROGRAM STOP 0 set, CO will contain function code and the
error may be evaluated. Upon return to this subroutine (TF46)
an exit is made to the executive routine (COMA) to check for
continuing the test or recycling this subroutine (TF46).

	SPECIFICATION SYMBOL SB-10163

TITLE: TF46

INPUT PARAMETERS (Listed Sequentially):
COMA

TEST PATTERNS	
TPAT	777777
TPAT1	000000
TPAT2	252525
TPAT3	525252
TPAT4	770000
TPAT5	007777
TPAT6	707070
TPAT7	070707
TPAR	TEST CELL

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1

BUFF2

TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):
COMA - (EXEC)

TFDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:
ERROR DISPLAY

PROGRAM STOP 0 - correct information in AU
                 incorrect information in AL
                 function code (46xxxx) in CO

PROGRAM SKIP 4 - set for console error display only
                 not set for error typeout (Function Code 46)

PROGRAM SKIP 0 - not set to continue test
                 set to recycle subroutine (TF46)
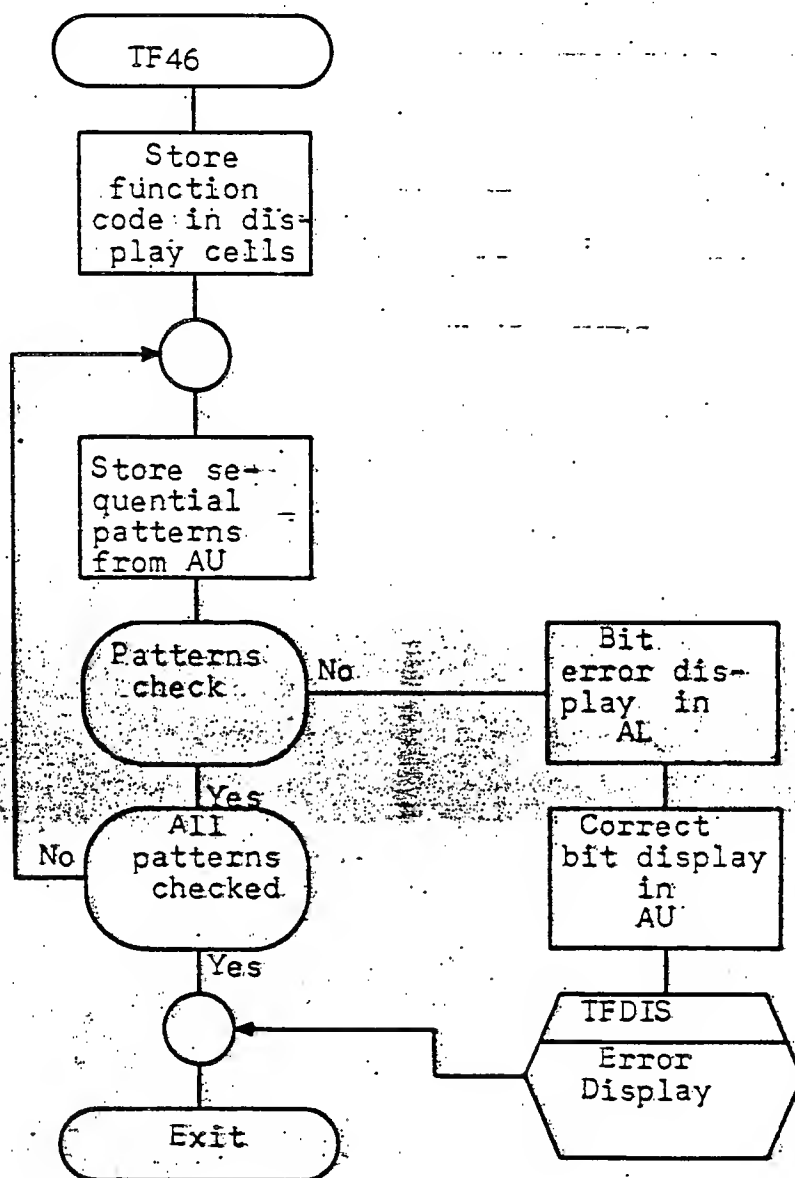
```
            ( TF46 )
               |
        +--------------+
        |    Store     |
        |   function   |
        | code in dis- |
        |  play cells  |
        +--------------+
               |
              (O)<-----------+
               |             |
        +--------------+     |
        | Store se-    |     |
        | quential     |     |
        | patterns     |     |
        | from AU      |     |
        +--------------+     |
               |             |
         ( Patterns )  No    +--------------+
         (  check   )------->|   Bit        |
               |             | error dis-   |
             Yes             | play  in     |
               |             |   AL         |
         (  All     )        +--------------+
    No   ( patterns )               |
   <-----( checked  )        +--------------+
               |             |  Correct     |
             Yes             | bit display  |
               |             |    in        |
              (O)<---+       |    AU        |
               |     |       +--------------+
         ( Exit )    |              |
                     |         /  TFDIS   \
                     +--------/   Error    \
                              \   Display  /
                               _____/
```

TF46: STORE A UPPER

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PROGRAM DATA PAGE

SPECIFICATION SYMBOL
SB-10163

TITLE: TS46 LEFT SHIFT AL (5046xx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TS46   KEY: 1218   IS LABEL DUPLICATE? No

PROGRAMMER: FWS modified by TLR   DATE: 8 Dec. 67

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 31

DESCRIPTION:

This subroutine checks the Left Shift AL command with its end-around capabilities.

First, the quantity 000001 is entered into AL and left-shifted one bit at a time until it should be in the bit 2^{17} position. AL is then tested for its ability to pass a one without picking up.

Secondly, one more left shift is executed to check the end-around feature from bit 2^{17} to bit 2^0.

Error displays are listed under alarms.

SPECIFICATION SYMBOL
SB-10163

TITLE: TS46

INPUT PARAMETERS (Listed Sequentially):

TPAT1 = 000000
TPAB1 = 000001
TSR430 = 000021
TS455 = 400000

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1

BUFF2

BUFF3

BUFF4

TEX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA (EXEC)

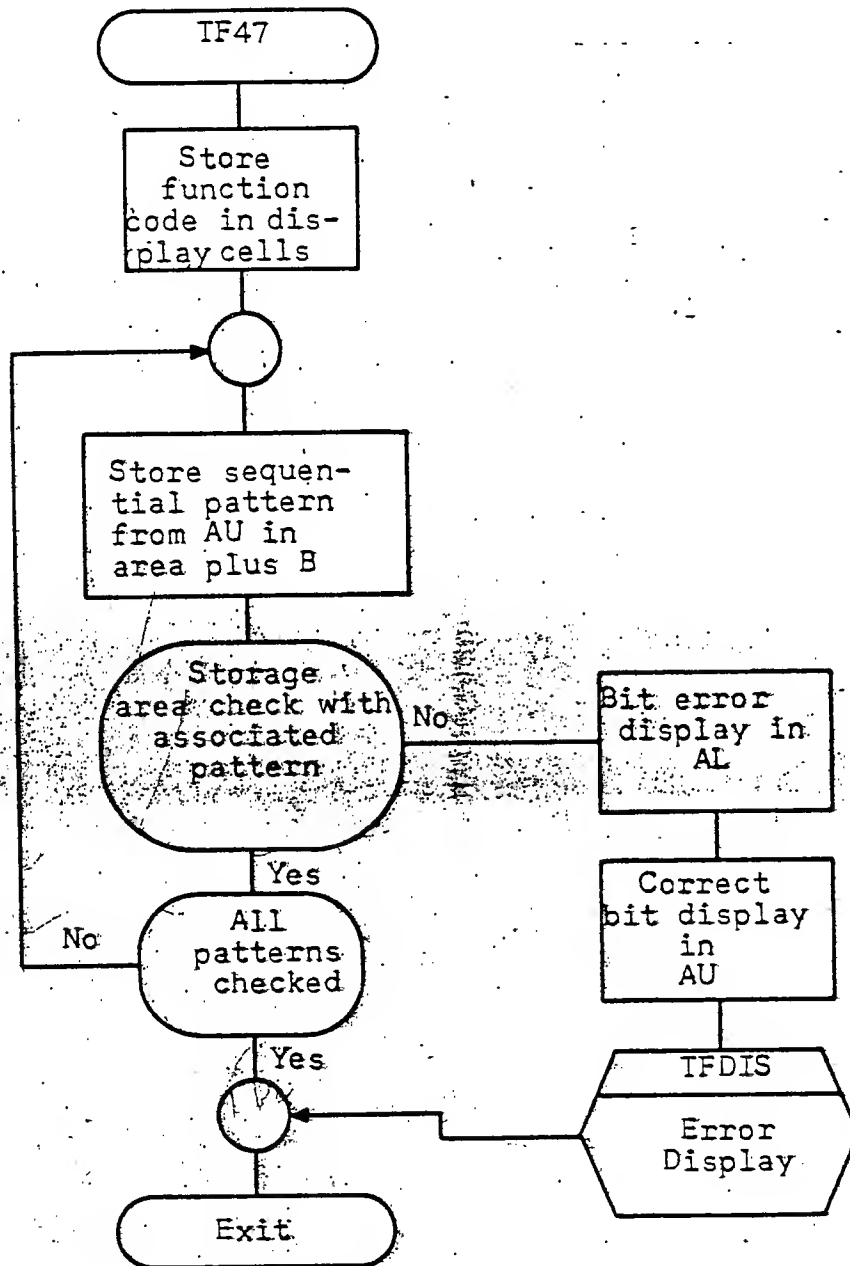TSDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY
PROGRAM STOP 0
CO/C1 = 504601
AL = Error
AU = 1-21, but was lost while shifting that count from 2^0.
AU = 400000, AL should equal 400000 unless bits were picked up.
AU = 000001, AL should equal 000001 unless end-around failed.
PROGRAM SKIP 4 - set for console error display only
              not set for error typeout (Function Code 5046)
PROGRAM SKIP 0 - set to recycle subroutine (TS46)
              not set to continue test

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```
        ( TS46 )                              ( A )
           │                                    │
  ┌─────────────────┐                ┌─────────────────┐
  │     Store       │                │    Enter AU     │
  │   function      │                │    with B       │
  │ code in dis-    │                │      or         │
  │   play cells    │                │    pattern      │
  └─────────────────┘                └─────────────────┘
           │                                    │
  ┌─────────────────┐                ┌─────────────────┐
  │   Set B to      │                │     TSDIS       │
  │      I          │                ├─────────────────┤
  │   Clear AU      │                │     Error       │
  └─────────────────┘                │    Display      │
           │                         └─────────────────┘
  ┌─────────────────┐                         │
  │   Enter AL      │                        ( B )
  │ with pattern    │
  │   (000001)      │
  └─────────────────┘
           │
          (●)◄──────────┐
           │            │
  ┌─────────────────┐   │
  │      LSH        │   │
  │      AL         │   │
  │      1X         │   │
  └─────────────────┘   │
           │            │
       ╱  AL  ╲  Yes  ( A )        ┌─────────────────┐
      (  ZERO  )────────────┐      │      LSH        │
       ╲      ╱             │      │      AL         │
           │ No             └─────►│      1X         │
       ╱  B = ╲  No                └─────────────────┘
      (  21   )───────┐                     │
       ╲      ╱       │                  ╱ AL =  ╲  No  ( A )
           │ Yes      │                 ( 000001 )─────────
       ╱ AL = ╲  No   │                  ╲       ╱
( A )─(400000 )       │                      │ Yes
       ╲      ╱  Yes  │                     ( B )
           └──────────┘                      │
                                     ┌─────────────────┐
                                     │      Exit       │
                                     └─────────────────┘
```
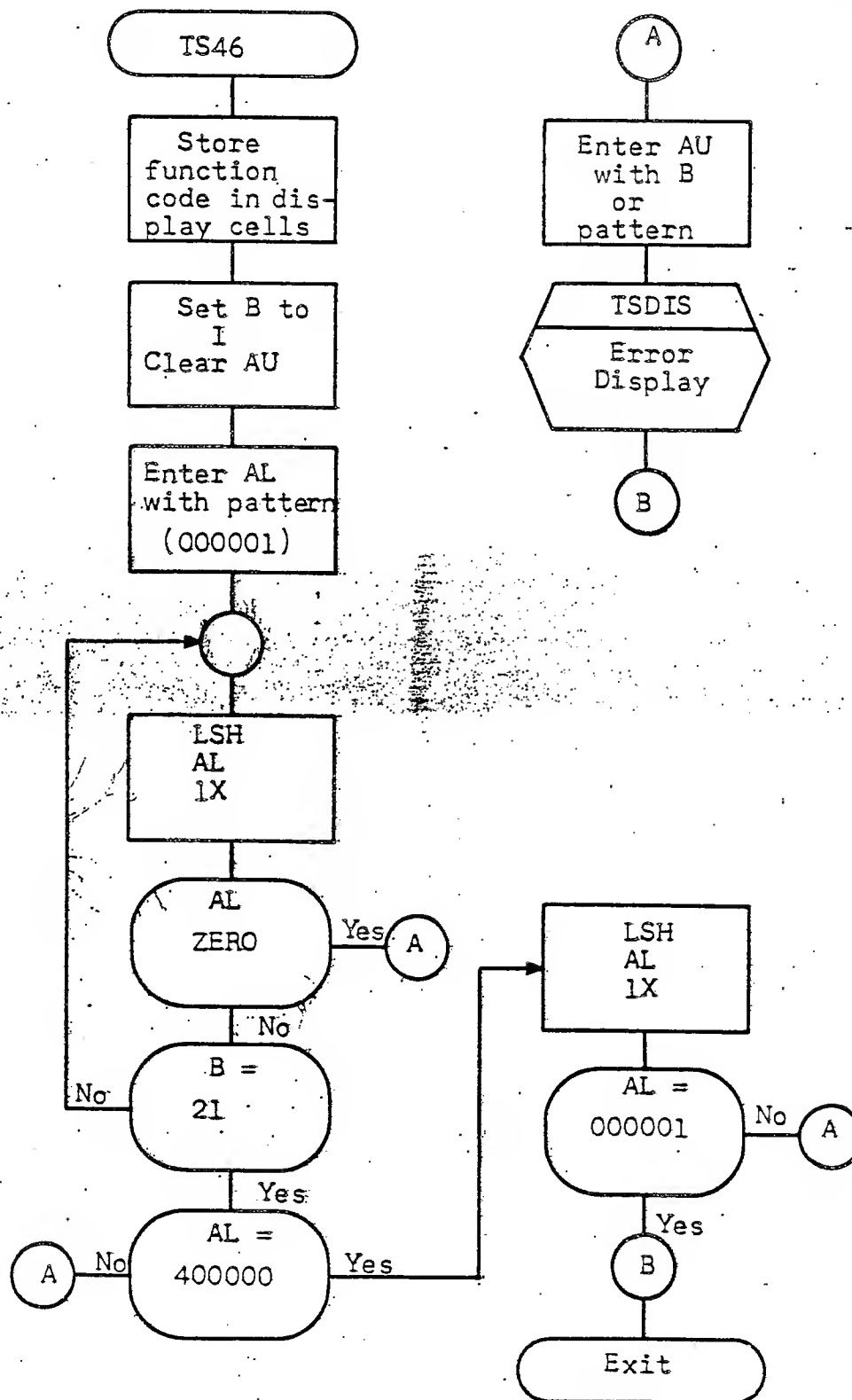
TS46: LEFT SHIFT AL BY K
$$5046\frac{XX}{K}$$

SPECIFICATION SYMBOL
SB-10163

TITLE: TF47 - STORE A UPPER MODIFIED BY B (47xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF47   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by TLR   DATE: 8 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 56

DESCRIPTION:

This subroutine checks the Store A Upper Modified By B command.
B is entered with a constant, and AU with a test-pattern constant.
A STRAUB command is then executed and AU is stored in a test cell.
Validity is checked by entering AL with the content of the test
cell and comparing AL and the test-pattern constant. If correct,
the next constant is entered into B and the cycle is repeated
until all test patterns have been checked. An exit is then made
to the executive routine (COMA). If an error is detected by any
of the validity checks, AU will contain the correct pattern, AL
the incorrect pattern, and an exit is made to the display sub-
routine. With PROGRAM STOP 0 set, CO will contain the function
code and the error may be evaluated. Upon return to this sub-
routine (TF47), an exit is made to the executive routine (COMA)
to check for continuing the test or recycling this subroutine (TF47).

SPECIFICATION SYMBOL
SB-10163

TITLE: TF47

INPUT PARAMETERS (Listed Sequentially):

COMA

TEST PATTERNS	
TPAT	777777
TPAT1	000000
TPAT2	252525
TPAT3	525252
TPAT4	770000
TPAT5	007777
TPAT6	707070
TPAT7	070707
TPAR	TEST CELL

OUTPUT PARAMETERS (Listed Sequentially):
BUFF1

BUFF2

TEX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA — (EXEC)
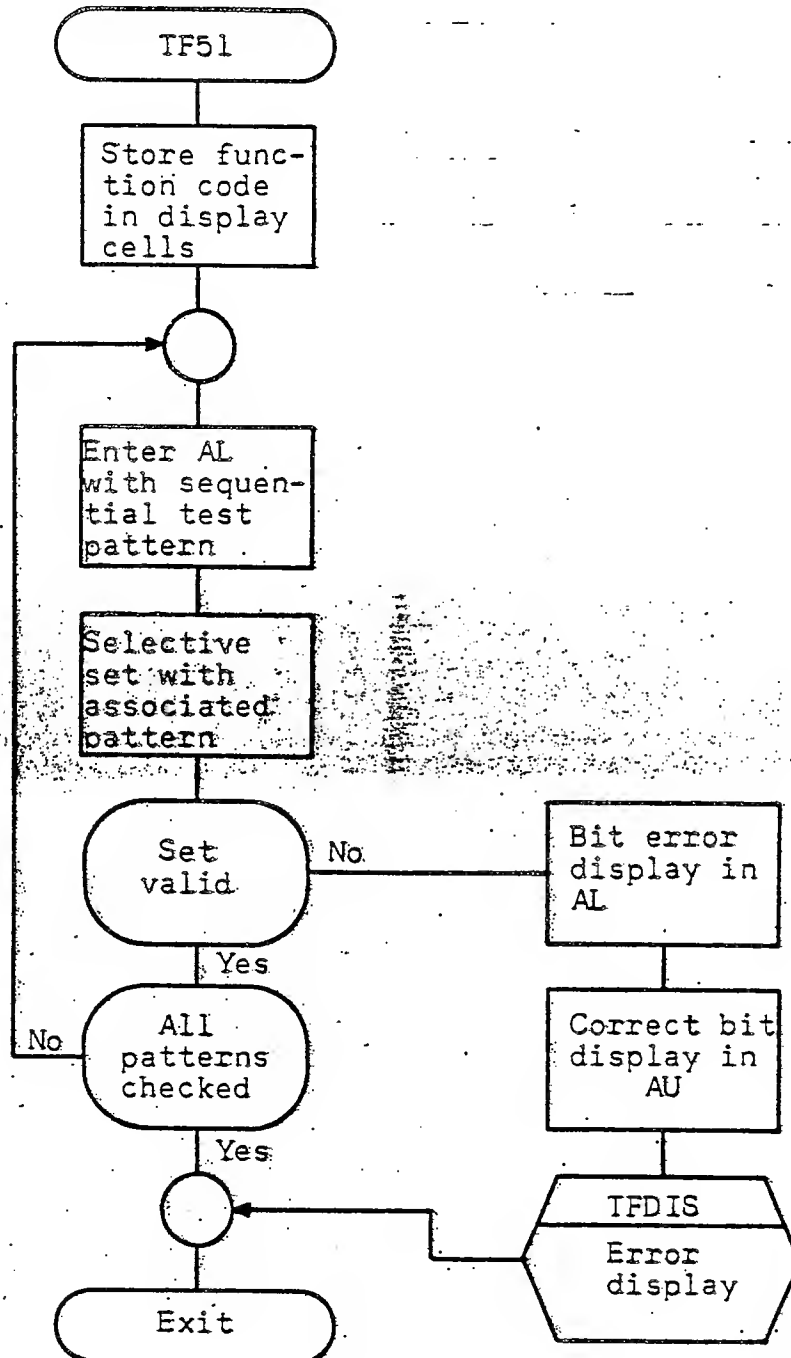
TFDIS — Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:
ERROR DISPLAY

PROGRAM STOP 0 — correct information in AU
incorrect information in AL
function code (47xxxx) in CO

PROGRAM SKIP 4 — set for console error display only
not set for error type out (Function Code 47)

PROGRAM SKIP 0 — not set to continue test
set to recycle subroutine (TF47)

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SPECIFICATION SYMBOL
- SB-10163

```
                    ┌──────────────┐
                    │     TF47     │
                    └──────────────┘
                           │
                  ┌──────────────────┐
                  │      Store       │
                  │    function      │
                  │  code in dis-    │
                  │   play cells     │
                  └──────────────────┘
                           │
                          ( )
                           │
              ┌────────────────────────┐
              │   Store sequen-        │
              │   tial pattern         │
              │   from AU in           │
              │   area plus B          │
              └────────────────────────┘
                           │
                   ┌───────────────┐
                   │   Storage     │         ┌──────────────┐
                   │ area check with│  No    │  Bit error   │
                   │  associated   │────────>│ display in   │
                   │   pattern     │         │     AL       │
                   └───────────────┘         └──────────────┘
                        Yes                         │
                         │                  ┌──────────────┐
                   ┌───────────┐            │   Correct    │
            No     │    All    │            │ bit display  │
        <──────────│ patterns  │            │     in       │
                   │  checked  │            │     AU       │
                   └───────────┘            └──────────────┘
                        Yes                         │
                        │                       TFDIS
                       ( )  <──────────────  ┌──────────────┐
                        │                    │    Error     │
                  ┌──────────┐               │   Display    │
                  │   Exit   │               └──────────────┘
                  └──────────┘
```

TF47: STORE A UPPER MODIFIED BY B.

SPECIFICATION SYMBOL

SB-10163

TITLE: TS 47 - LEFT SHIFT A (5047XX)

DECK IDENTIFIER: FACT

CS-1 LABEL: TS47   KEY: 1218   IS LABEL DUPLICATE? No

PROGRAMMER: FWS modified by TLR   DATE: 8 Dec. 67

NUMBER OF L$_4$ OUTPUT INSTRUCTIONS: 26

DESCRIPTION:

This subroutine check Left Shift A command with its end-around
capabilities.

First, the quantity 000001 is entered into AL and left shifted
22 times and AL checked equal to zero.

Second, A is shifted 22 more times and AU checked equal to zero;
AL checked equal to 000001 for end-around check.

Error displays listed under alarms.

SPECIFICATION SYMBOL
SB-10163

TITLE: TS47

INPUT PARAMETERS (Listed Sequentially):

  TPAT1 = 000000
  TPAB1 = 000001

OUTPUT PARAMETERS (Listed Sequentially):
  BUFF1

  BUFF2

  BUFF3

  BUFF4

  TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

  COMA (EXEC)

  TSDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:
  ERROR DISPLAY
  PROGRAM STOP 0
  CO/C1 = 504722.
          AU = 000001 AL should equal 000000, bit picked up in AL
          AL = 000001 AU should equal 000001, shifting from AL 2^{29}
             to AU 2^0.
          AU = 000000 AL should equal 000001, checking end around
          AU = 000001 AL should equal 000001, checking end around

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SPECIFICATION SHEET

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SPECIFICATION SYMBOL
SB-10163

ALARMS AND/OR REMARKS (Continued):

    PROGRAM SKIP 4 - set for console error display only
                        not set for error typeout (Function Code 5047)
    PROGRAM SKIP 0 - set to recycle subroutine (TS47)
                        not set to continue test

Due to the interacting of these displays, the Maintenance
Engineer should OP STEP through this routine to determine more
clearly which feature failed.

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SPECIFICATION SYMBOL
SB-10163

```
  ( TS47 )                         ( A )
     |                              |
 +-----------+              +-------------+
 | Store     |              | Enter AU/   |
 | function  |              |   AL        |
 | code in   |              | with        |
 | display   |              | pattern     |
 | cells     |              +-------------+
 +-----------+                     |
     |                        < TSDIS    >
 +-----------+                < Error    >
 | Clear     |                < Display  >
 | AU        |                     |
 +-----------+                    ( B )
     |
 +-----------+
 | Enter AL  |
 | with      |
 | pattern   |
 | (000001)  |
 +-----------+
     |
 +-----------+
 | LSH A 22X |
 +-----------+
     |
 ( AL ZERO ) --No--> ( A )
     |
    Yes
     |
 ( AU ZERO ) --Yes--> ( A )
     |
    No
     |
 +-----------+
 | LSH A 22X |
 +-----------+
     |                      ( AL=      ) --No--> ( A )
( A )--No--( AU ZERO )--Yes--( 000001  )
                                   |
                                  Yes
                                   |
                                  ( B )
                                   |
                              (  Exit  )
```
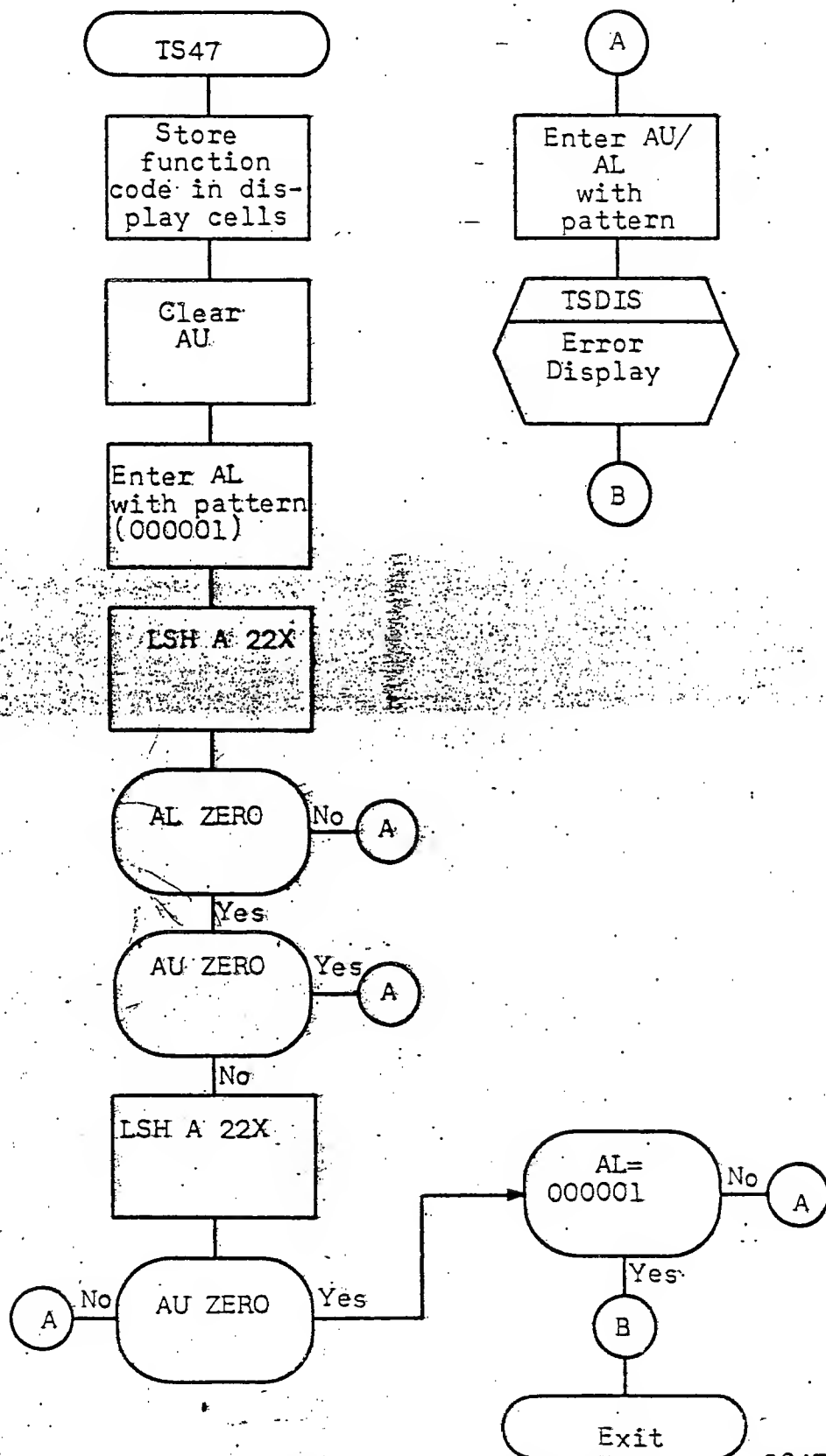
TS 47: LEFT SHIFT A BY K

5047XX
K

SPECIFICATION SYMBOL
SB-10163

TITLE: TF51 - SELECTIVE SET (51xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF51   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by TLR   DATE: 8 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 38

DESCRIPTION:

This subroutine checks the Selective Set command. AL is entered
with a test-pattern constant, and a SLSET command is executed.
Validity is checked by a subroutine where AL is compared to a
test-pattern constant. If correct, an exit is made to another
51 command and validity is again checked by the subroutine. On
this exit from the subroutine AL is entered with a new, test-pat-
tern constant, and another SLSET command and validity check
are performed. This sequence is repeated until all patterns have
been checked. An exit is then made to the executive routine
(COMA). If an error is detected by any of the validity checks,
AL will contain the incorrect pattern and AU will contain the
correct pattern. An exit is then made to the display sub-
routine where, with PROGRAM STOP O set, CO will contain the
function code and the error may be evaluated. Upon return to
this subroutine (TF51) an exit is made to the executive routine
(COMA) to check for continuing the test or recycling this sub-
routine (TF51).

SPECIFICATION SYMBOL
SB-10163

TITLE: TF51

INPUT PARAMETERS (Listed Sequentially):
COMA

TEST PATTERNS	
TPAT	777777
TPAT1	000000
TPAT2	252525
TPAT3	525252
TPAT6	707070.
TPAT7	070707
TPAB1	000001
TPAB1+1	777776

OUTPUT PARAMETERS (Listed Sequentially):
BUFF1

BUFF2

TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):
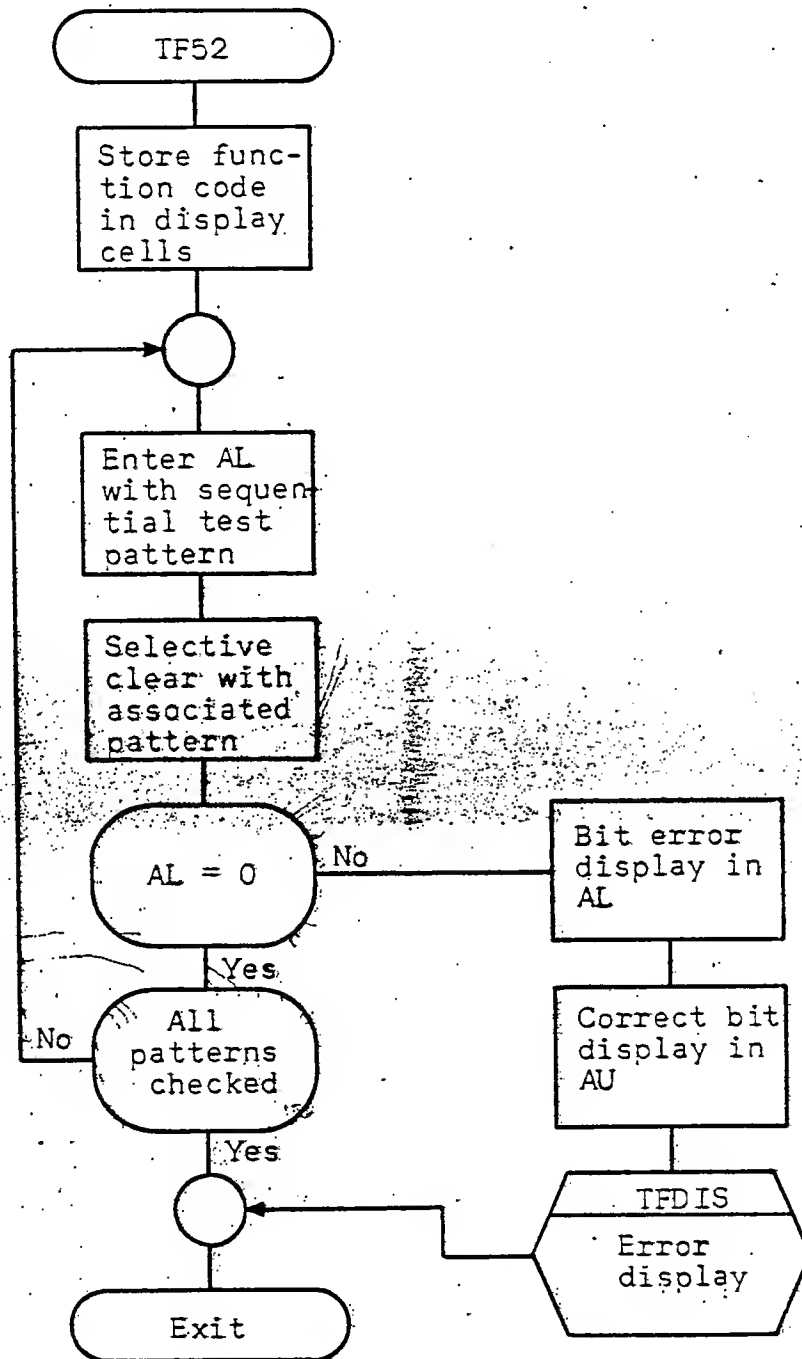
COMA (EXEC.)

TFDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:
ERROR DISPLAY

PROGRAM STOP 0 - correct information in AU
incorrect information in AL
function code (51xxxx) in CO

PROGRAM SKIP 4 - set for console error display only
not set for error typeout (Function Code 51)

PROGRAM SKIP 0 - not set to continue test
set to recycle subroutine (TF51)

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SPECIFICATION SHEET

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SPECIFICATION SYMBOL
SB-10163

```
            ┌─────────────┐
            │    TF51     │
            └──────┬──────┘
                   │
            ┌──────┴──────┐
            │ Store func- │
            │ tion code   │
            │ in display  │
            │ cells       │
            └──────┬──────┘
                   │
                  (○)◄──────────────┐
                   │                │
            ┌──────┴──────┐         │
            │ Enter AL    │         │
            │ with sequen-│         │
            │ tial test   │         │
            │ pattern     │         │
            └──────┬──────┘         │
                   │                │
            ┌──────┴──────┐         │
            │ Selective   │         │
            │ set with    │         │
            │ associated  │         │
            │ pattern     │         │
            └──────┬──────┘         │
                   │                │
            ╭──────┴──────╮  No   ┌──────────────┐
            │     Set     ├──────►│ Bit error    │
            │    valid    │       │ display in   │
            ╰──────┬──────╯       │ AL           │
                   │ Yes          └──────┬───────┘
            ╭──────┴──────╮              │
       No   │    All      │       ┌──────┴───────┐
     ┌──────┤  patterns   │       │ Correct bit  │
     │      │  checked    │       │ display in   │
     │      ╰──────┬──────╯       │ AU           │
     │             │ Yes          └──────┬───────┘
     │            (○)◄─────────┐         │
     │             │           │   ╭─────┴──────╮
     │      ┌──────┴──────┐    │   │  TFDIS     │
     └──────┤    Exit     │    └───┤  Error     │
            └─────────────┘        │  display   │
                                   ╰────────────╯
```

TF51:   SELECTIVE SET

SPECIFICATION SYMBOL

SB-10163

TITLE: TS51 - SKIP ON NO BORROW (505100)

DECK IDENTIFIER: FACT

CS-1 LABEL: TS51   KEY: 1218   IS LABEL DUPLICATE? No

PROGRAMMER: FMS modified by TLR   DATE: 8 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 35

DESCRIPTION:

This subroutine checks the Skip On No Borrow command which is used after an Add A or Subt A function. It establishes whether or not a borrow condition exists, since no end around borrow correction is logically available in this machine.

Add A and Subt A commands are executed with and without borrow generation and the borrow FF checked to determine failure.

Error displays are listed under alarms.

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PROGRAM DATA PAGE (Cont)

SPECIFICATION SYMBOL
SB-10163

TITLE: TS51

INPUT PARAMETERS (Listed Sequentially):
 TPAT2 = 252525
 TPAT3 = 525252

OUTPUT PARAMETERS (Listed Sequentially):
 BUFF1

 BUFF2

 BUFF3

 BUFF4
 TFX
ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):
 COMA (EXEC)

 TSDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:
 ERROR DISPLAY
 PROGRAM STOP 0
 C0/C1 = 505100

 If A = 525252525253, it should not have skipped and did.
 If A = 252525252525 or
        000000000000, it should have skipped and didn't.

    PROGRAM SKIP 4 - set for console error display only
                     not set for error typeout (Function Code 5051)

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SPECIFICATION SHEET

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SPECIFICATION SYMBOL
SB-10163

ALARMS AND/OR REMARKS (Continued):

PROGRAM SKIP 0 - set to recycle subroutine (TS51)
not set to continue test
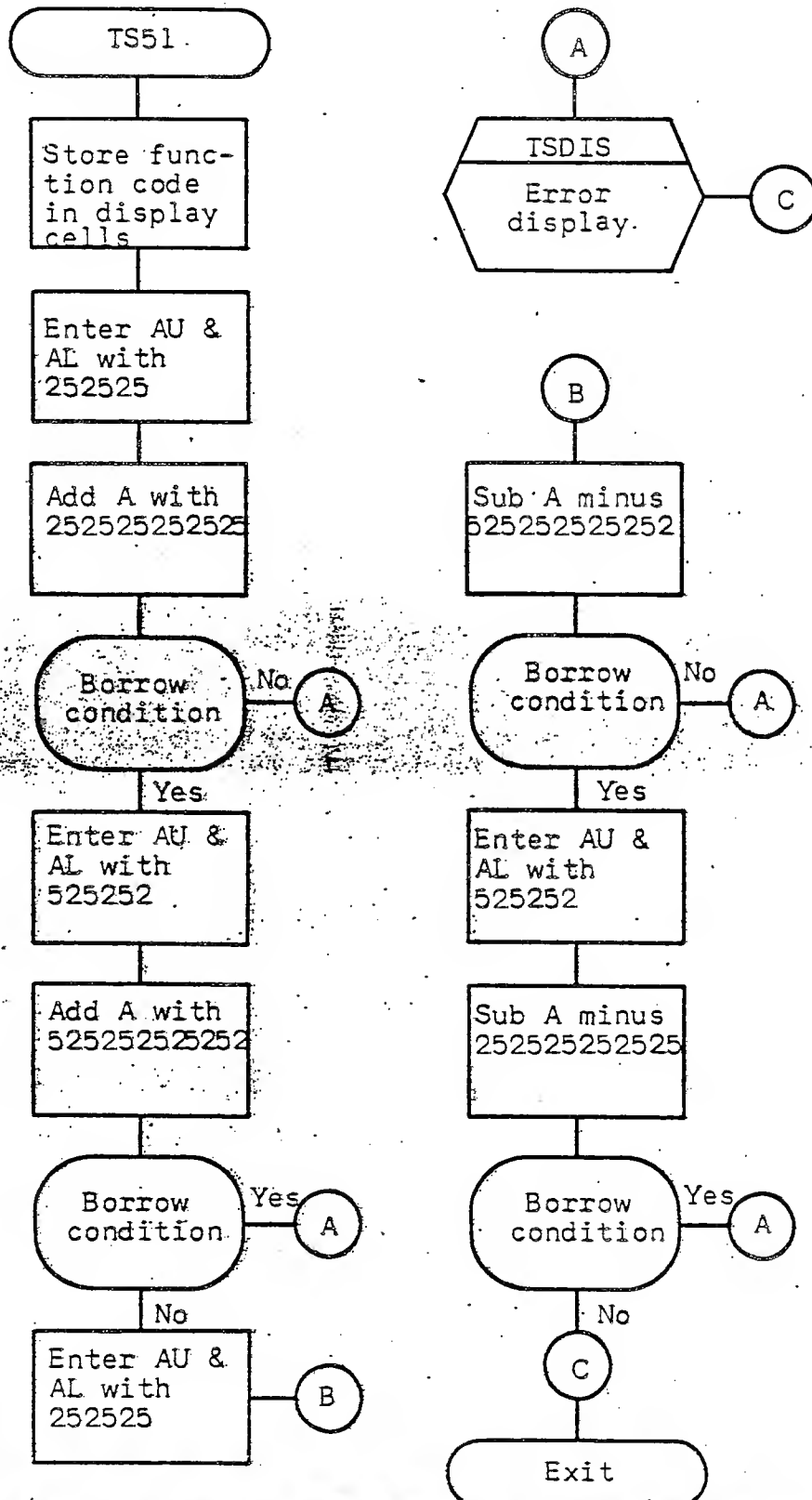
SPECIFICATION SYMBOL
SB-10163

(TS51)

Store func-
tion code
in display
cells

Enter AU &
AL with
252525

Add A with
252525252525

Borrow
condition — No → (A)
Yes

Enter AU &
AL with
525252

Add A with
525252525252

Borrow
condition — Yes → (A)
No

Enter AU &
AL with
252525 — (B)

(A)

TSDIS
Error
display. — (C)

(B)

Sub A minus
525252525252

Borrow
condition — No → (A)
Yes

Enter AU &
AL with
525252

Sub A minus
252525252525

Borrow
condition — Yes → (A)
No

(C)

Exit

TS51:   SKIP ON NO BORROW 505100

SPECIFICATION SYMBOL
SB-10163

TITLE: TF52 -SELECTIVE CLEAR (52xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF52.   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by TLR   DATE: 8 Dec. 67

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 33

DESCRIPTION:

This subroutine tests the performance of the Selective Clear in-
struction (Function Code 52). A Lower is entered with a test
pattern and the Selective Clear command is executed. Then through
use of the Jump AL zero and Jump AL non zero commands the SLCL
execution is checked for validity. If the execution was proper
the next, sequential test pattern is checked in the afore-mentioned
manner until all patterns have been used. If all checks prove
correct an exit is made to the executive routine (COMA). Should
the validity check on any pattern detect an error, A Upper is
entered with the correct information. A Lower contains the in-
correct information and an exit is made to the display subroutine
(TSDIS). Upon returning to this subroutine (TF52) an exit is
made to the executive routine (COMA) to check for continuance of
the test or the recycling of this subroutine (TF52).

SPECIFICATION SYMBOL
SB-10163

TITLE: TF52

INPUT PARAMETERS (Listed Sequentially):
COMA

TEST PATTERNS

TPAT	777777
TPAT1	000000
TPAT2	252525
TPAT3	525252
TPAT6	707070
TPAT7	070707
TPAB1	000001
TPAB1+1	777776

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1

BUFF2

TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):
COMA (EXEC)

TSDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:
ERROR DISPLAY - PROGRAM STOP 0 set
　　　　　　　　correct information in AU
　　　　　　　　incorrect information in AL
　　　　　　　　function code (52xxxx) in CO

　　　　　　　PROGRAM SKIP 4 - set for console error display only
　　　　　　　　　　　　　　not set for error typeout (Function
　　　　　　　　　　　　　　Code 52)

　　　　　　　PROGRAM SKIP 0 not set - continue test; if set -
　　　　　　　　　　　　　　recycle subroutine (TF52)

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SPECIFICATION SHEET

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SPECIFICATION SYMBOL
SB-10163

TF52: SELECTIVE CLEAR

SPECIFICATION SYMBOL
SB-10163

TITLE: TS52 - SKIP ON OVERFLOW (505200)

DECK IDENTIFIER: FACT

CS-1 LABEL: TS52   KEY: 1218 IS LABEL DUPLICATE? No

PROGRAMMER: FWS modified by TLR   DATE: 8 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 26

DESCRIPTION:

This subroutine checks the Skip On Overflow command. It is used after any arithmetic function to establish whether an overflow condition existed as a result of that arithmetic process.

A divide instruction is executed first for no overflow and again to check when an overflow does exist.

Error displays are listed under alarms.

SPECIFICATION SYMBOL
SB-10163

TITLE: TS52

INPUT PARAMETERS (Listed Sequentially):

TPAT1 = 000000
TPAB1 = 000001

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1

BUFF2

BUFF3

BUFF4

TFX

ABNORMAL EXITS (Listed Sequentially):

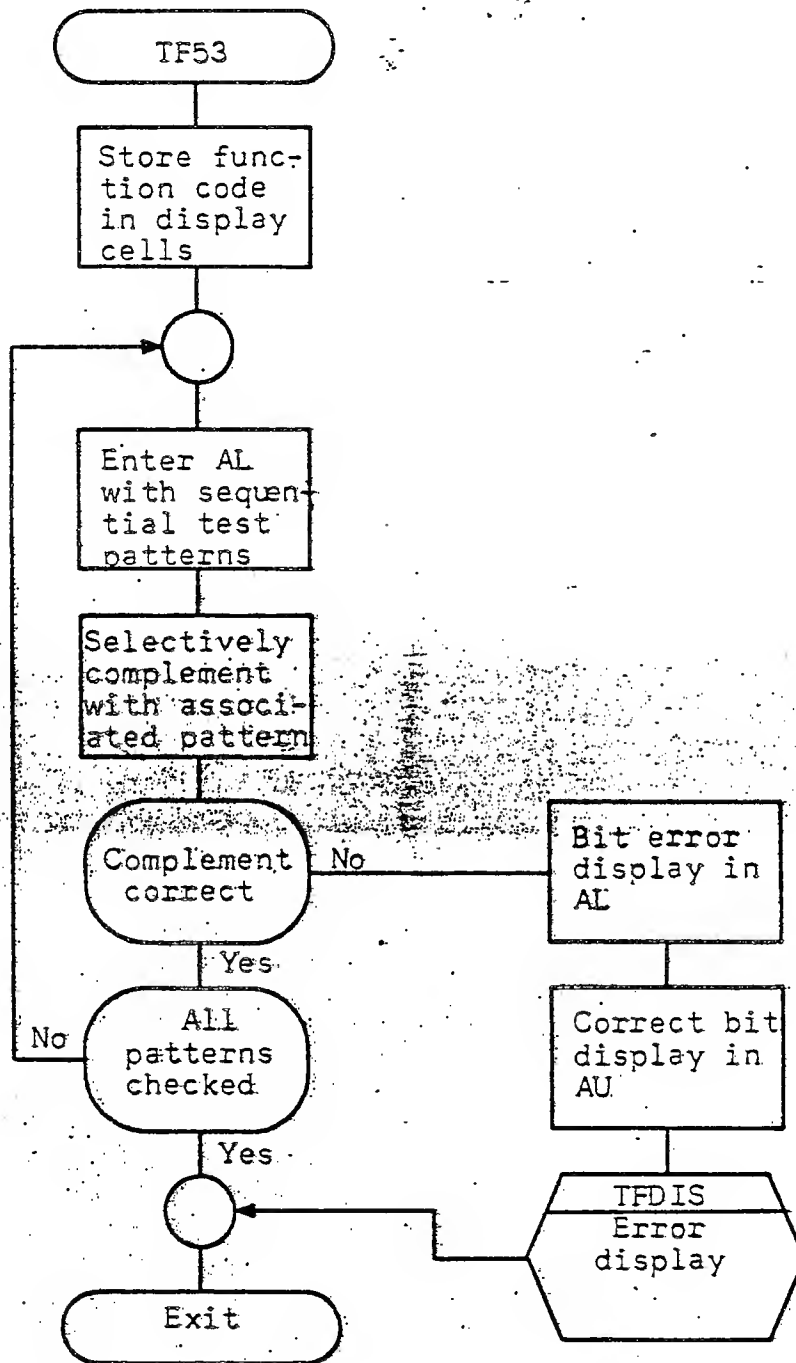NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA (EXEC)

TSDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:
ERROR DISPLAY
PROGRAM STOP 0
CO/C1 = 505200
If A = 000000003777, it skipped when an overflow didn't exist.
If A = 000001000000, is should have skipped and didn't.
If A = to either of these, the divide instruction failed.
    PROGRAM SKIP 4 - set for console error display only
          not set for error typeout (Function Code
       5052)

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SPECIFICATION SHEET

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SPECIFICATION SYMBOL
SB-10163

ALARMS AND/OR REMARKS (Continued):

PROGRAM SKIP 0 - set to recycle subroutine
not set to continue test (TS52)
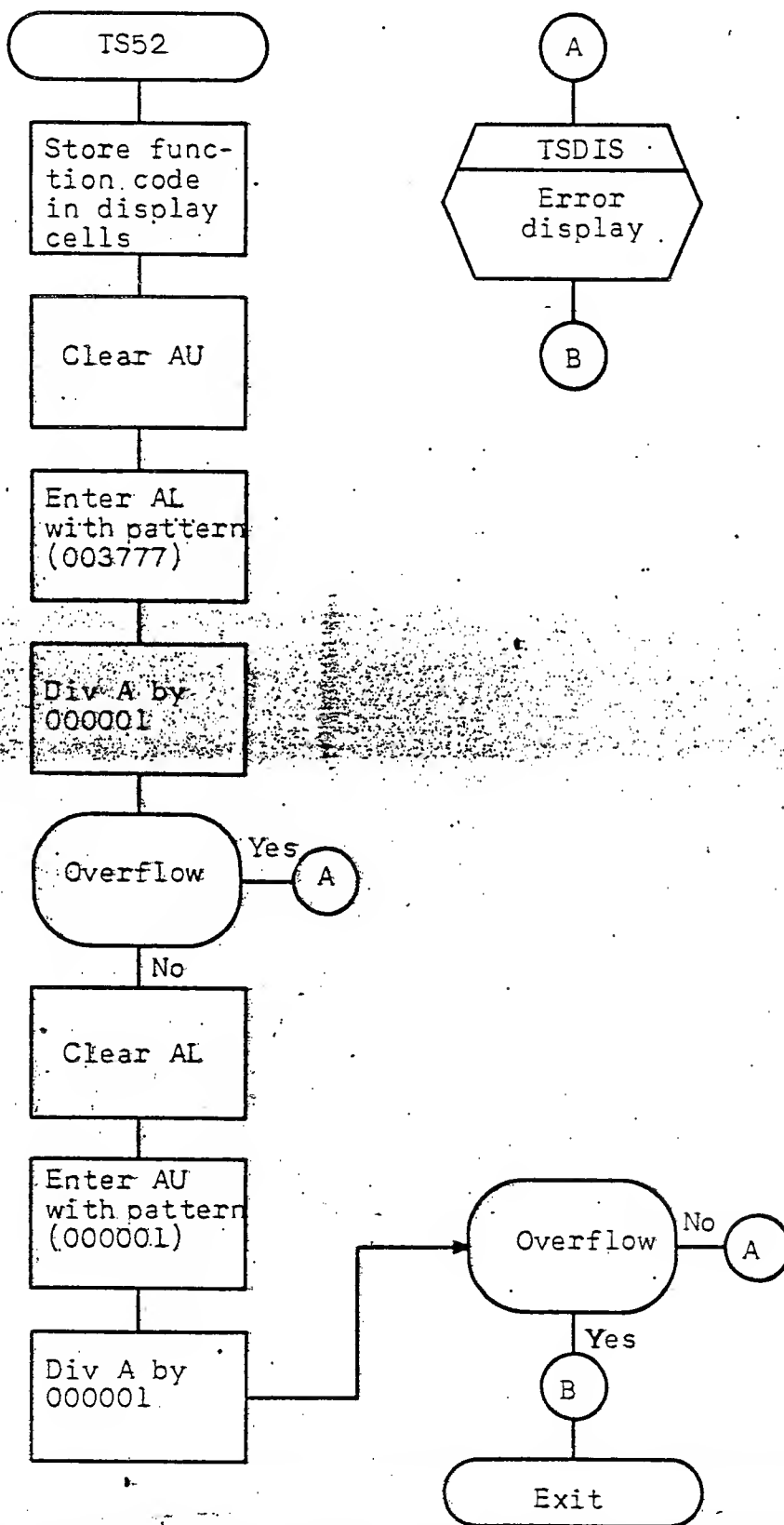
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SPECIFICATION SHEET

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SPECIFICATION SYMBOL
SB-10163.

TS52

Store func-
tion code
in display
cells

Clear AU

Enter AL
with pattern
(003777)

Div A by
000001

Overflow —Yes→ A

No

Clear AL

Enter AU
with pattern
(000001)

Div A by
000001

A

TSDIS

Error
display

B

Overflow —No→ A

Yes

B

Exit

TS52: SKIP ON OVERFLOW 505200

SPECIFICATION SYMBOL
SB-10163

TITLE: TF53 - SELECTIVE COMPLEMENT (53xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF53 ____ KEY: ____ IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by TLR ____ DATE: 8 Dec. 67

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 38

DESCRIPTION:

This subroutine checks the Selective Complement command. AL is
entered with a test-pattern constant. A SLCP command is executed
using another test-pattern constant. Next, validity is checked
by comparing the results in AL with an associated, test-pattern
constant, and if correct, the next, test-pattern constant is
entered into AL. This sequence is repeated until all test
patterns have been checked. An exit is then made to the executive
routine (COMA). If an error is detected by any of the validity
checks, the incorrect pattern is in AL, and the correct pattern
is in AU. Following that an exit is made to the display sub-
routine, where with PROGRAM STOP 0 set, CO will contain the
function code and the error may be evaluated. Upon return to
this subroutine (TF53) an exit is made to the executive routine
(COMA) to check for program continuance or the recycling of
this subroutine.

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SPECIFICATION SHEET

P ROGRAM DATA PAGE (Cont) | SHEET 349 | REVISION —

SPECIFICATION SYMBOL
SB-10163

TITLE: TF53

INPUT PARAMETERS (Listed Sequentially):

COMA

TEST PATTERNS	
TPAT	777777
TPAT+1	777777
TPAT1	000000
TPAT2	252525
TPAT3	525252
TPAT3+1	525252
TPAT6	707070
TPAT7	070707

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1

BUFF2

TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA (EXEC)

TFDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:
ERROR DISPLAY - PROGRAM STOP 0 set
    correct information in AU
    incorrect information in AL
    function code (53xxxx) in CO
   PROGRAM SKIP 4 - set for console error display only
        not set for error typeout (Function
        Code 53)
    PROGRAM SKIP 0 not set - continue test; if set -
        recycle subroutine (TF53)

```
        ╭──────────────╮
        │     TF53     │
        ╰──────────────╯
                │
        ┌──────────────┐
        │ Store func-  │
        │ tion code    │
        │ in display   │
        │ cells        │
        └──────────────┘
                │
               ( )
                │
        ┌──────────────┐
        │ Enter AL     │
        │ with sequen- │
        │ tial test    │
        │ patterns     │
        └──────────────┘
                │
        ┌──────────────┐
        │ Selectively  │
        │ complement   │
        │ with associ- │
        │ ated pattern │
        └──────────────┘
                │
        ╭──────────────╮   No    ┌──────────────┐
        │ Complement   │────────▶│ Bit error    │
        │ correct      │         │ display in   │
        ╰──────────────╯         │ AL           │
                │ Yes            └──────────────┘
        ╭──────────────╮                │
   No   │ All          │         ┌──────────────┐
 ◀──────│ patterns     │         │ Correct bit  │
        │ checked      │         │ display in   │
        ╰──────────────╯         │ AU           │
                │ Yes            └──────────────┘
               ( )◀──────────────╱──────────────╲
                │                 │   TFDIS      │
        ╭──────────────╮          │   Error      │
        │     Exit     │          │   display    │
        ╰──────────────╯          ╲──────────────╱
```

TF53:   SELECTIVE COMPLEMENT

SPECIFICATION SYMBOL
SB-10163

TITLE: ___TS53 - SKIP ON NO OVERFLOW (505300)___

DECK IDENTIFIER: ___FACT___

CS-1 LABEL: ___TS53___ KEY: ___ IS LABEL DUPLICATE? ___No___

PROGRAMMER: ___FWS modified by ILR___ DATE: ___8 December 1967___

NUMBER OF L₄ OUTPUT INSTRUCTIONS: ___26___

DESCRIPTION:

This subroutine checks the Skip On No Overflow command. AU, AL, and the Overflow registers are cleared, and AU is entered with a test-pattern constant. A Divide A command is executed using a test-pattern constant which results in an overflow. A SKPNOV command is executed. Validity is checked by not skipping the next instruction but instead, entering AL and AU with the next constants and executing another Divide A command. This 2nd Divide A command results in a no overflow condition. Another SKPNOV command is executed and validity is checked. If correct, the subroutine exits to the executive routine (COMA). If the validity check detects an error, AU will contain the remainder, AL the quotient, and the subroutine exits to the display subroutine. If PROGRAM STOP 0 is set, CQ will contain the function code, and the error can be evaluated. Upon return to this subroutine (TS53) an exit is made to the executive routine (COMA) to check for program continuance or the recycling of this subroutine.

SPECIFICATION SYMBOL
SB-10163

TITLE: TS53

INPUT PARAMETERS (Listed Sequentially):
  COMA

                                    TEST PATTERNS
                                    TPAT1   000000
                                    TPAB1   000001

OUTPUT PARAMETERS (Listed Sequentially):
  BUFF1

  BUFF2

  BUFF3

  BUFF4
  TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA (EXEC)

TSDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:
ERROR DISPLAY - PROGRAM STOP 0 set
                remainder in AU
                quotient in AL
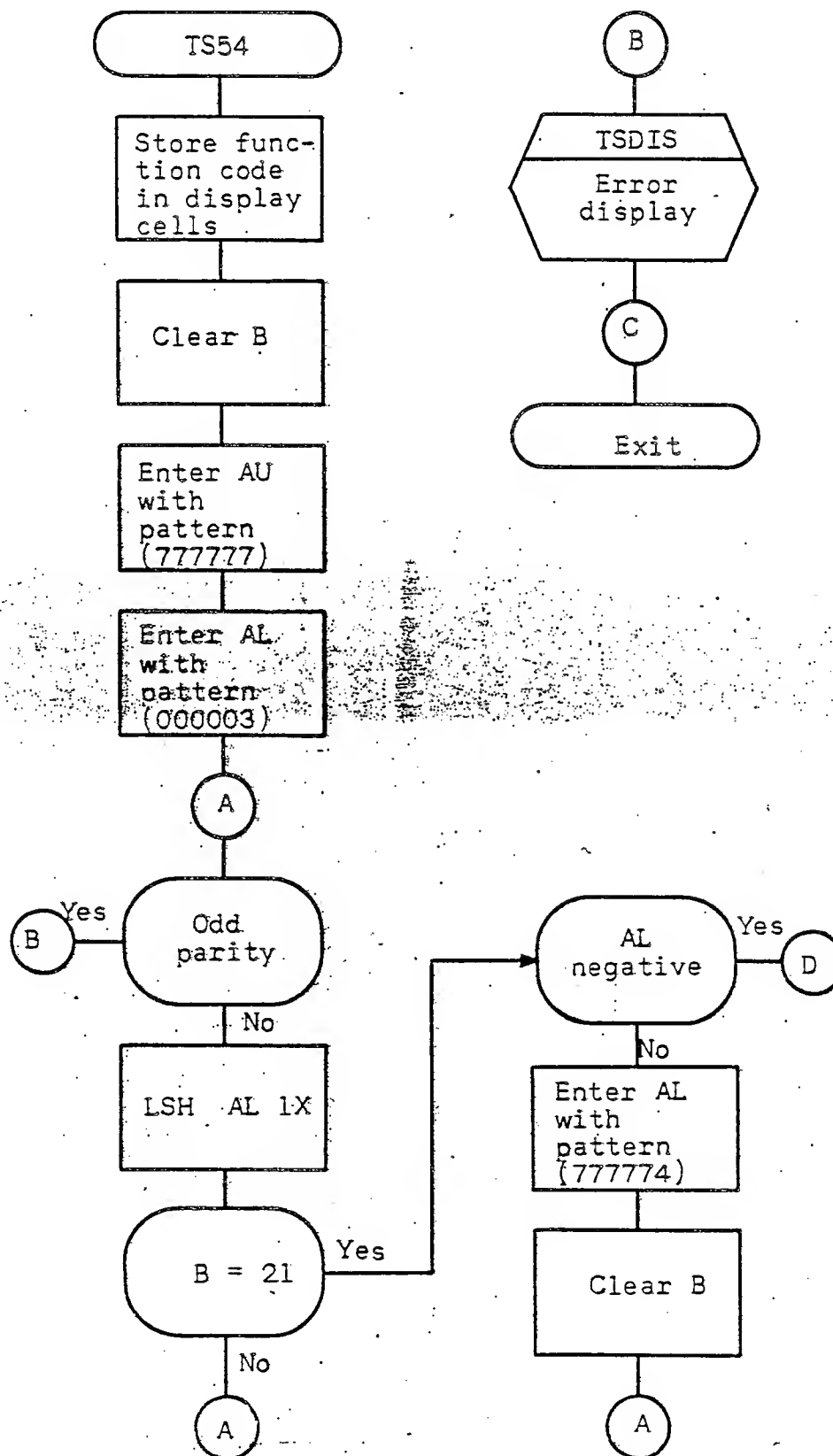   function code (505300) in CO
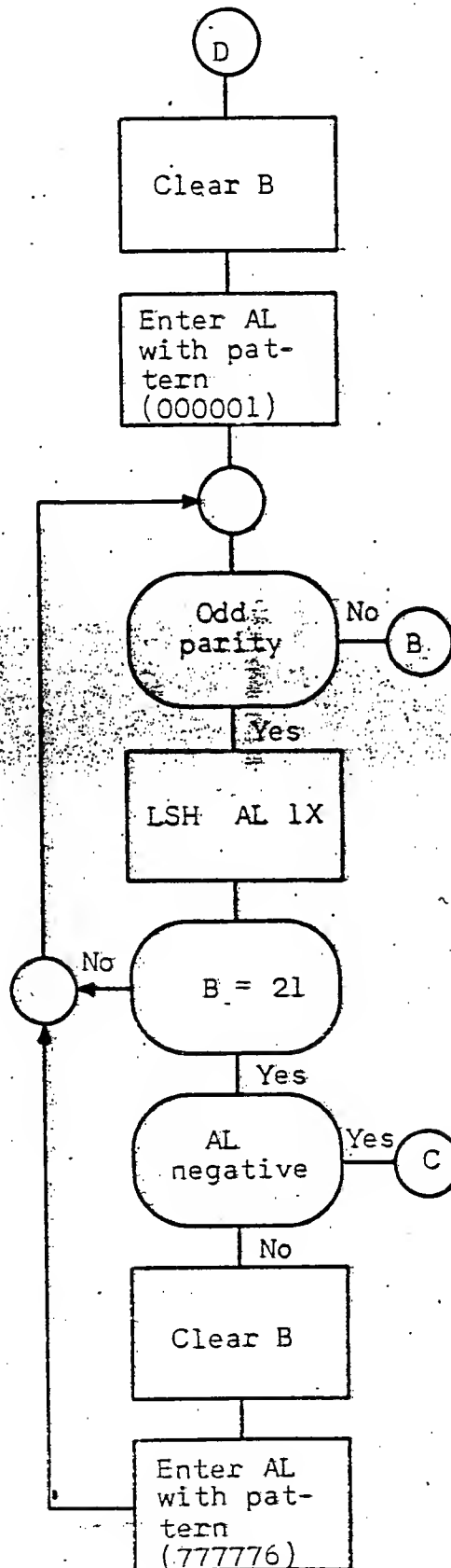   PROGRAM SKIP 4 - set for console error display only
                              not set for error typeout (Function
                              Code 5053)
                PROGRAM SKIP 0 not set - continue test; if set -
                              recycle subroutine (TS53)

SPECIFICATION SYMBOL
SB-10163
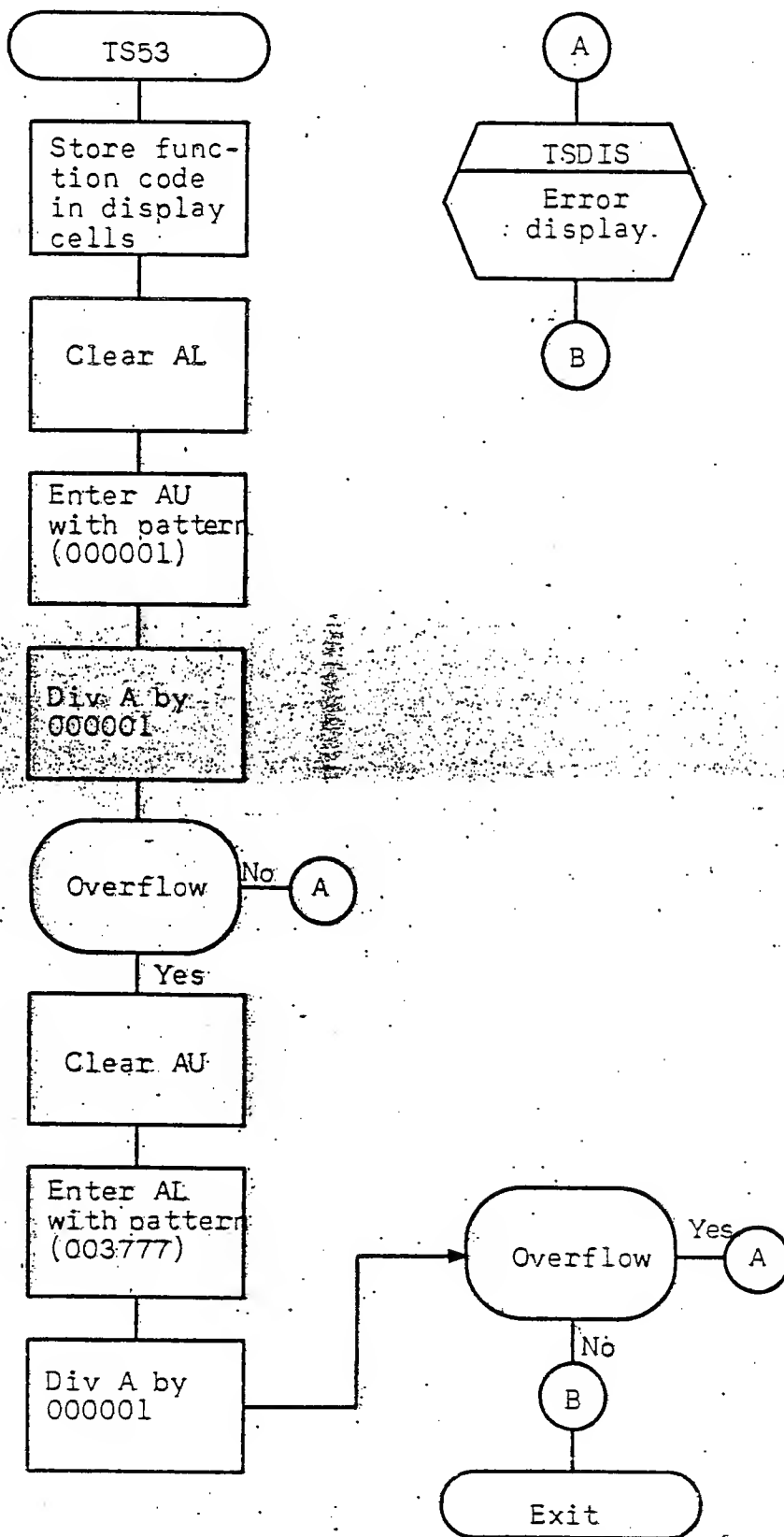
TS53: SKIP ON NO OVERFLOW 505300

SPECIFICATION SYMBOL
SB-10163

TITLE: TS54 - SKIP ON ODD PARITY (505400)

DECK IDENTIFIER: FACT

CS-1 LABEL: TS54   KEY: _____   IS LABEL DUPLICATE? No

PROGRAMMER: EWS modified by TLR   DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: _____ 36 _____

DESCRIPTION:

This subroutine checks the Skip On Odd Parity command. First,
the routine checks that no skip is executed if parity is even,
and secondly, that a skip is executed when parity is odd. A
test-pattern constant with even parity is entered into AU and
AL, and a SKPODD command is executed. Validity is checked, and
if correct, AL is left shifted one place. This process is
repeated on all combination of bits of the two patterns until B
is equal to 21. If AL is positive, a new, test-pattern constant
with even parity is entered into AL, and the above sequence is
repeated. This time, however, when B becomes equal to 21, AL
will be negative, and a test-pattern with odd parity is entered
into AL. A SKPODD command is executed, and validity is checked.
If correct, AL will be left shifted one place and the above
sequence will be repeated until B is equal to 21. If AL is
positive, another test-pattern with odd parity is entered into
AL and the above sequence is repeated until B is equal to 21
and AL is negative. An exit is then made to the executive
routine (COMA). If an error is detected by the validity checks,
AU and AL will contain the parity patterns and an exit is made
to the display subroutine. With PROGRAM STOP 0 set, CO will
contain the function code, and the error may be evaluated.
Upon return to this subroutine (TS54), an exit is made to the
executive routine (COMA) to check for program continuance or the
recycling of this subroutine.

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SPECIFICATION SHEET

PROGRAM DATA PAGE (Cont)

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SPECIFICATION SYMBOL
SB-10163

TITLE: TS54

INPUT PARAMETERS (Listed Sequentially):
COMA

TEST PATTERNS
| TPAT | 777777 |
| TPAB6+1 | 000021 |

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1

BUFF2

BUFF3

BUFF4

TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA (EXEC)

TSDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY - PROGRAM STOP 0 set
parity pattern in AU
parity pattern in AL
function code (505400) in CO
PROGRAM SKIP 4 - set for console display only
not set for error typeout (Function
code 5054).
PROGRAM SKIP 0 not set - continue test; if set -
recycle subroutine (TS54)

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SPECIFICATION SHEET

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SPECIFICATION SYMBOL
SB-10163

TS54

Store function code in display cells

Clear B

Enter AU with pattern (777777)

Enter AL with pattern (000003)

A

Odd parity — Yes → B

No

LSH AL 1X

B = 21 — Yes

No

A

B

TSDIS
Error display

C

Exit

AL negative — Yes → D

No

Enter AL with pattern (777774)

Clear B

A

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SPECIFICATION SHEET

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SPECIFICATION SYMBOL
SB-10163

D

Clear B

Enter AL
with pat-
tern
(000001)

Odd parity — No → B

Yes

LSH AL 1X

B = 21 — No

Yes

AL negative — Yes → C

No

Clear B

Enter AL
with pat-
tern
(777776)

TS54:   SKIP ON ODD PARITY
505400

SPECIFICATION SYMBOL
SB-10163

TITLE: TF55 - INDIRECT JUMP (55xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF55   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by TLR   DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 21

DESCRIPTION:

This subroutine checks the Indirect Jump command. The subroutine
consists of an IJP to a series of Indirect Jumps, and if all jump
commands are completed and correct, an exit is made to the
executive routine (COMA). If an error occurs, an exit is made
to the display subroutine, where with PROGRAM STOP 0 set, CO will
contain the function code, and the error may be evaluated. (No
display in AU or AL). Upon return to this subroutine (TF55) an
exit is made to the executive routine (COMA) to check for program
continuance or the recycling of this sburoutine.

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SPECIFICATION SHEET

P R O G R A M   D A T A   P A G E (Cont) | SHEET 359 | REVISION

SPECIFICATION SYMBOL
SB-10163

TITLE: TF55

INPUT PARAMETERS (Listed Sequentially):
COMA

TEST PATTERNS
TPAT1   000000

OUTPUT PARAMETERS (Listed Sequentially):
BUFF1

BUFF2

TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):
COMA (EXEC)

TFDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:
ERROR DISPLAY - PROGRAM STOP 0 set
                 (no display in AU or AL)
                 function code (55xxxx) in CO
               PROGRAM SKIP 4 - set for console error display only
                                not set for error typeout (Function
                                Code 55)
               PROGRAM SKIP 0 not set - continue test; if set -
                                        recycle subroutine (TF55)
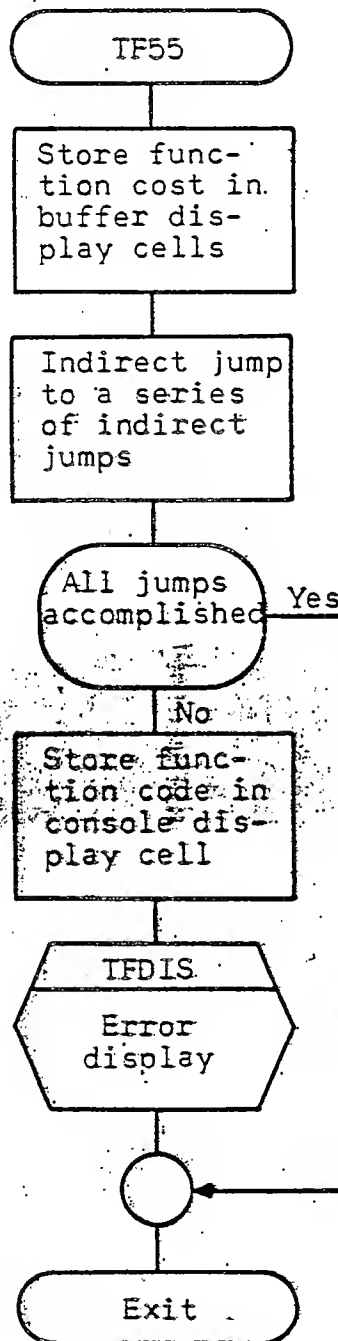
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SPECIFICATION SHEET

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SPECIFICATION SYMBOL
SB-10163

```
        ( TF55 )
           |
  +------------------+
  | Store func-      |
  | tion cost in.    |
  | buffer dis-      |
  | play cells       |
  +------------------+
           |
  +------------------+
  | Indirect jump    |
  | to a series      |
  | of indirect      |
  | jumps            |
  +------------------+
           |
   ( All jumps      )  Yes
   ( accomplished )------+
           | No          |
  +------------------+   |
  | Store func-      |   |
  | tion code in     |   |
  | console dis-     |   |
  | play cell        |   |
  +------------------+   |
           |             |
   < TFDIS           >   |
   <  Error          >   |
   <  display        >   |
           |             |
          (O)<-----------+
           |
        ( Exit )
```

TF55:   INDIRECT JUMP

SPECIFICATION SYMBOL
SB-10163

TITLE: TS55- SKIP ON EVEN PARITY (505500)

DECK IDENTIFIER: FACT

CS-1 LABEL: TS55   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: FWS modified by TLR   DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 36

DESCRIPTION:

This subroutine checks the Skip On Even Parity, command. It
first checks that no skip is executed with odd parity, and
secondly, that a skip is executed with even parity. AU is
entered with a test-pattern constant and AL with an odd-parity
constant. SKPEVN command is executed and validity is checked.
If correct, (odd parity) no skip is executed and AL is left
shifted one place. This process is repeated until B is equal
to 21. If AL is positive, a different odd-parity constant is
entered into AL and the above sequence is repeated until B is
equal to 21 and AL is negative. AL is then entered with an even-
parity constant, and a SKPEVN executed. If correct, (even
parity) a skip is executed and AL is left shifted one place.
This process is repeated until B is equal to 21. If AL is
positive, a new even-parity constant is entered into AL, and
the above sequence is repeated until B is equal to 21 and AL is
negative. An exit is then made to the executive routine (COMA).
If an error is detected by any of the validity checks, an exit
is made to the display subroutine. AU and AL will contain the
parity patterns and if PROGRAM STOP 0 is set, CO will contain
the function code, and the error may be evaluated. Upon return
to this subroutine (TS55) an exit is made to the executive
routine (COMA) to check for program continuance or the recycling
of this subroutine.

SPECIFICATION SYMBOL
SB-10163

TITLE: TS55

INPUT PARAMETERS (Listed Sequentially):
COMA

TEST PATTERNS
TPAT   777777
TPAB6+1   000021

OUTPUT PARAMETERS (Listed Sequentially):
BUFF1

BUFF2

BUFF3

BUFF4

TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA (EXEC)

TSDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:
ERROR DISPLAY - PROGRAM STOP 0 set
                parity pattern in AU
                parity pattern in AL
                function code (505500) in CO
                PROGRAM SKIP 4 - set for console error display only
                            not set for error typeout (Function
                            Code 5055)
                PROGRAM SKIP 0 not set - continue test; if set -
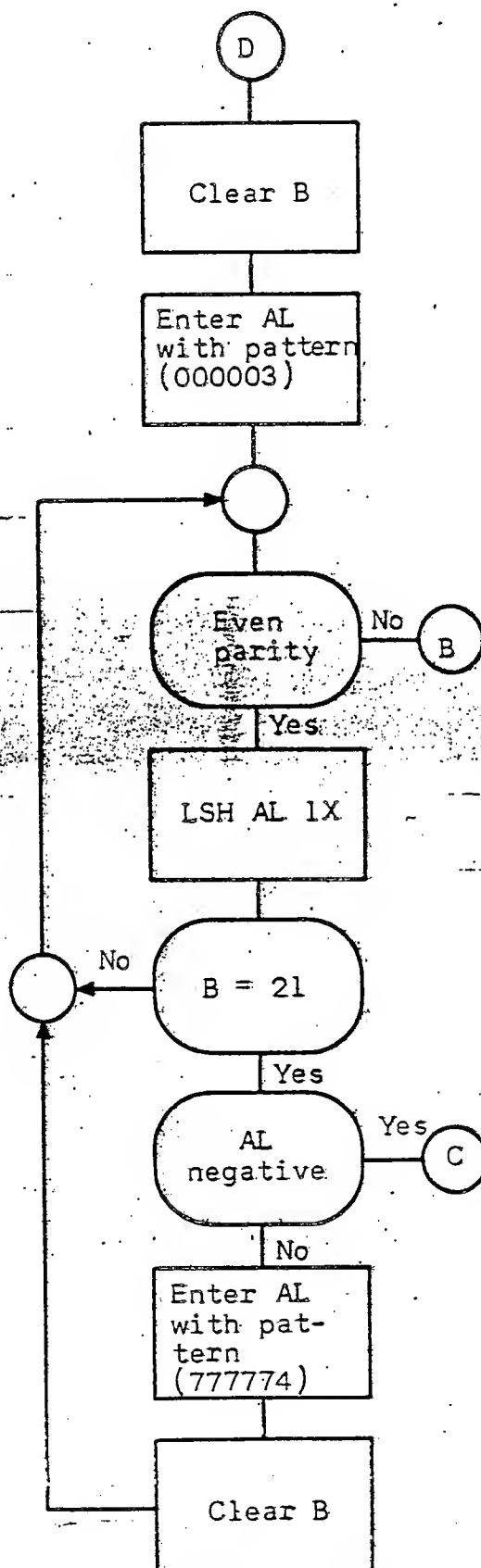   recycle subroutine (TS55)

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SPECIFICATION SYMBOL
SB-10163

TS55

Store function code in display cells

Clear B

Enter AU with pattern (777777)

Enter AL with pattern (000001)

A

B

Yes — Even parity

No

LSH AL IX

B = 21 — Yes

No

A

B

TSDIS
Error display

C

Exit

AL negative — Yes — D

No

Enter AL with pattern (777776)

Clear B

A

TS55: SKIP ON EVEN PARITY 505500

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SPECIFICATION SYMBOL
SB-10163

```
                    ( D )
                      |
              ┌───────────────┐
              │    Clear B     │
              └───────────────┘
                      |
              ┌───────────────┐
              │  Enter AL      │
              │  with pattern  │
              │  (000003)      │
              └───────────────┘
                      |
                     ( )◄──────┐
                      |        │
              ╭───────────────╮│
              │  Even    ─── No──( B )
              │  parity       ││
              ╰───────────────╯│
                    Yes        │
              ┌───────────────┐│
              │   LSH AL 1X    ││
              └───────────────┘│
                      |         │
         No ╭───────────────╮  │
       ( )◄─│    B = 21      │  │
         │  ╰───────────────╯  │
         │        Yes          │
         │  ╭───────────────╮  │
         │  │    AL     ─ Yes─( C )
         │  │  negative     │  │
         │  ╰───────────────╯  │
         │        No           │
         │  ┌───────────────┐  │
         │  │  Enter AL      │  │
         │  │  with pat-     │  │
         │  │  tern          │  │
         │  │  (777774)      │  │
         │  └───────────────┘  │
         │          |           │
         │  ┌───────────────┐  │
         └──│    Clear B     │──┘
            └───────────────┘
```
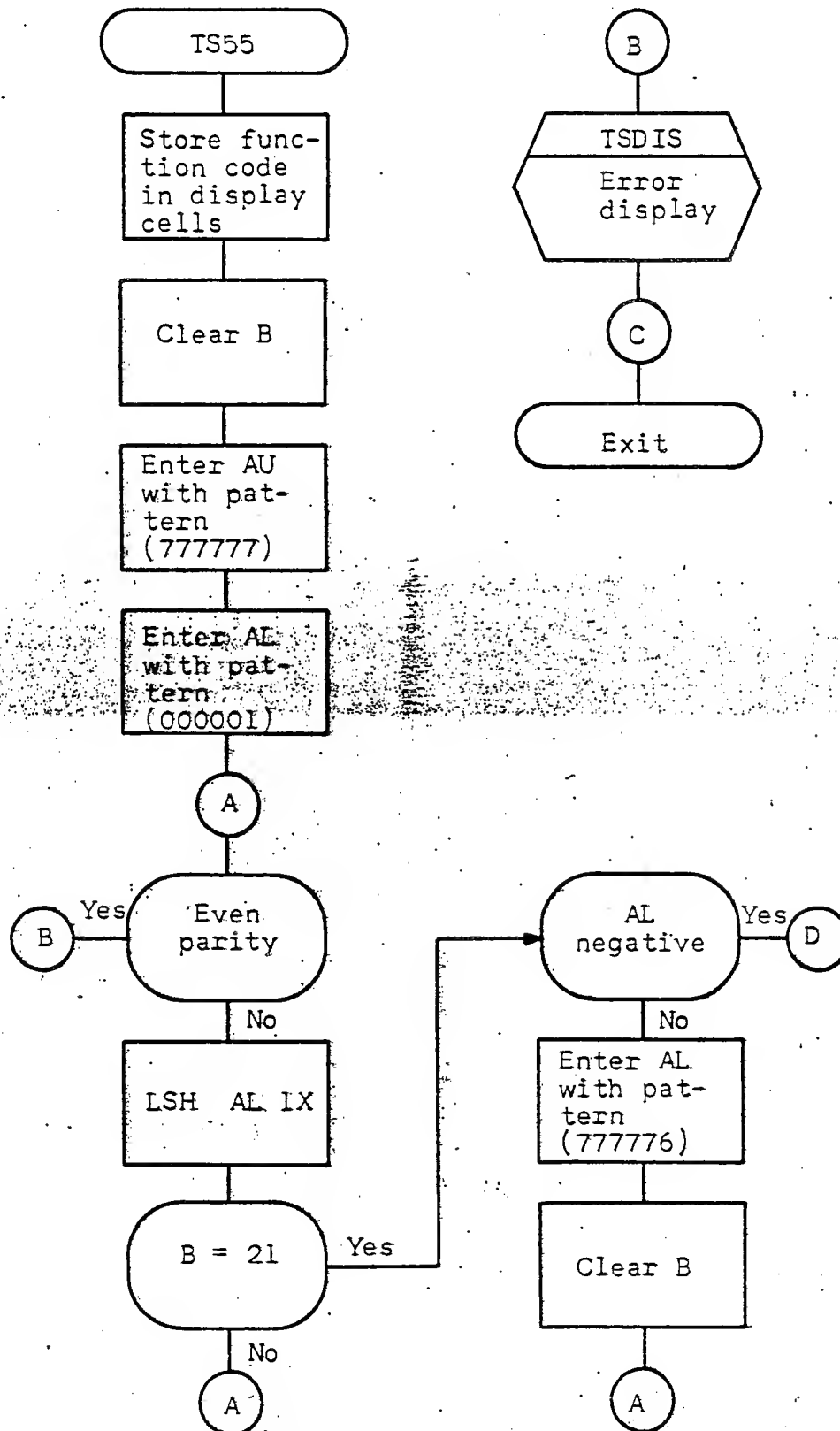
TS55:   SKIP ON EVEN
PARITY 505500
(continued)

SPECIFICATION SYMBOL
SB-10163

TITLE: TF56 - B SKIP (56xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF56 _____ KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by TLR _____ DATE: 8 December 1967

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 41

DESCRIPTION:

This subroutine checks the B Skip command. First, B is cleared.
Then, a BSK command is executed. If B is not equal to a test-
pattern constant, a jump back to the B Skip command is executed.
This process is repeated until B is equal to the test-pattern constant.
Validity is checked by entering AL with the contents of B and AU
with the correct test pattern. A compare of AL and an associated
test pattern is executed; if correct, B is cleared and the above
sequence is repeated using a different, test-pattern constant until
all BSK commands have been completed. An exit is then made to the
executive routine (COMA). If an error is detected by any of the
validity checks, AU will contain the correct pattern, AL the in-
correct pattern, and an exit is made to the display subroutine.
If PROGRAM STOP 0 is set, CO will contain the function code and
the error may be evaluated. Upon return to this subroutine (TF56)
an exit is made to the executive routine (COMA) to check for
continuing the test or recycling this subroutine (TF56).

SPECIFICATION SYMBOL
SB-10163

TITLE: TF56

INPUT PARAMETERS (Listed Sequentially):
COMA

TEST PATTERNS	
TPAT5	007777
TPAT5+1	007777
TPAB2+1	000505
TPAS3	000002
TPAK	002020

OUTPUT PARAMETERS (Listed Sequentially):
BUFF 1
BUFF 2
TEX

ABNORMAL EXITS (Listed Sequentially):

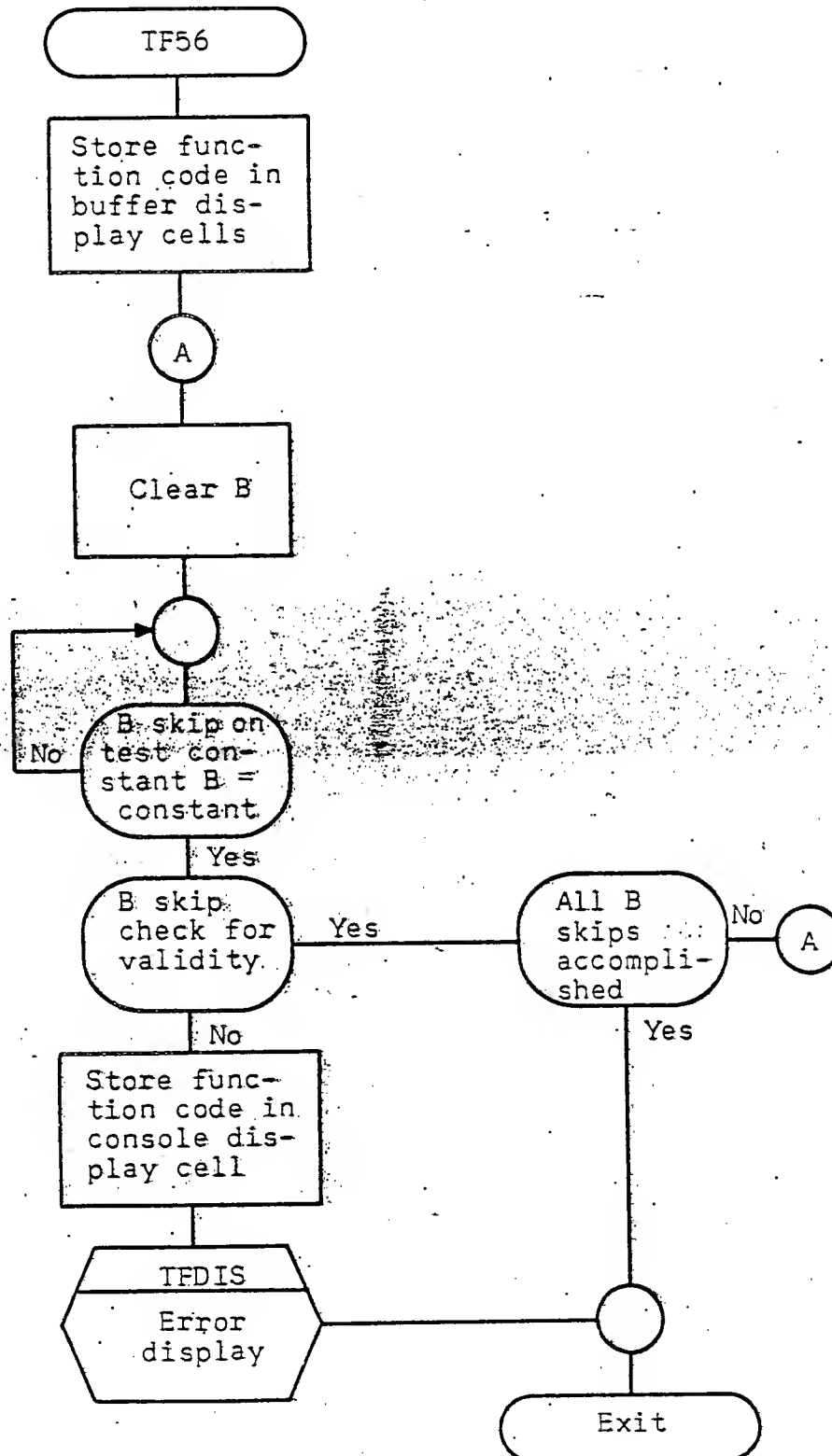NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA (EXEC)
TFDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:
EPROR DISPLAY -   PROGRAM STOP 0 set
                  correct information in AU
                  incorrect information in AL
                  function code (56xxxx) in CO
                  PROGRAM SKIP 4 - set for console error display only
                                   not set for error typeout (Function
                                   Code)
                  PROGRAM SKIP 0 not set to continue test; set to
                  recycle subroutine (TF56)

```
        ┌──────────────┐
        │     TF56     │
        └──────┬───────┘
               │
        ┌──────┴───────┐
        │ Store func-  │
        │ tion code in │
        │ buffer dis-  │
        │ play cells   │
        └──────┬───────┘
               │
              (A)
               │
        ┌──────┴───────┐
        │              │
        │   Clear B    │
        │              │
        └──────┬───────┘
               │
              (○)
               │
      No  ┌────┴─────┐
     ┌────│ B skip on│
     │    │ test con-│
     │    │ stant B =│
     │    │ constant │
     │    └────┬─────┘
     │       Yes
     │    ┌────┴─────┐         ┌──────────┐
     │    │ B skip   │  Yes    │  All B   │  No
     │    │ check for│─────────│  skips   │────(A)
     │    │ validity │         │ accompli-│
     │    └────┬─────┘         │   shed   │
     │       No                └────┬─────┘
     │    ┌────┴─────┐            Yes
     │    │Store func-│            │
     │    │tion code in│           │
     │    │console dis-│           │
     │    │play cell  │            │
     │    └────┬─────┘             │
     │    ┌────┴─────┐             │
     │    │  TFDIS   │             │
     │    │  Error   │─────────(○)─┘
     │    │ display  │             │
     │    └──────────┘      ┌──────┴───────┐
     │                      │     Exit     │
     │                      └──────────────┘
```

TF56:   B SKIP

| SPECIFICATION SYMBOL |
| SB-10163 |

TITLE: TF57 - INDEX SKIP (57xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF57   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by TLR   DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 38

DESCRIPTION:

This subroutine checks the Index Skip command. AL is entered
with a test-pattern constant and stored in the Index Cell. An
ISK command is executed, (Y-1), and repeated until Y (Index Call)
is equal to 0. Validity is checked by entering AL with the
Index Call contents, if AL is equal to zero the execution is
proper and the next, Sequential, test pattern is entered in AL
and stored in the Index Cell. The above sequence is repeated
until all Index Skip patterns have been completed, and then an
exit is made to the executive routine (COMA). If an error is
detected by any of the validity checks, AU will contain the
correct pattern, AL the incorrect pattern, and an exit made to
the display subroutine. With PROGRAM STOP 0 set, CO will contain
the function code and the error may be evaluated. Upon return
to this subroutine (TF57) an exit is made to the executive
routine (COMA) to check for continuing the test or recycling
this subroutine.

SPECIFICATION SYMBOL
SB-10163

TITLE: TF57

INPUT PARAMETERS (Listed Sequentially):
COMA

TEST PATTERNS
TPAT	777777
TPAT1	000000
TPAT5	007777
TPAS1	000017
TPAK6	002525
TPAR	INDEX CELL

OUTPUT PARAMETERS (Listed Sequentially):
BUFF1
BUFF2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):
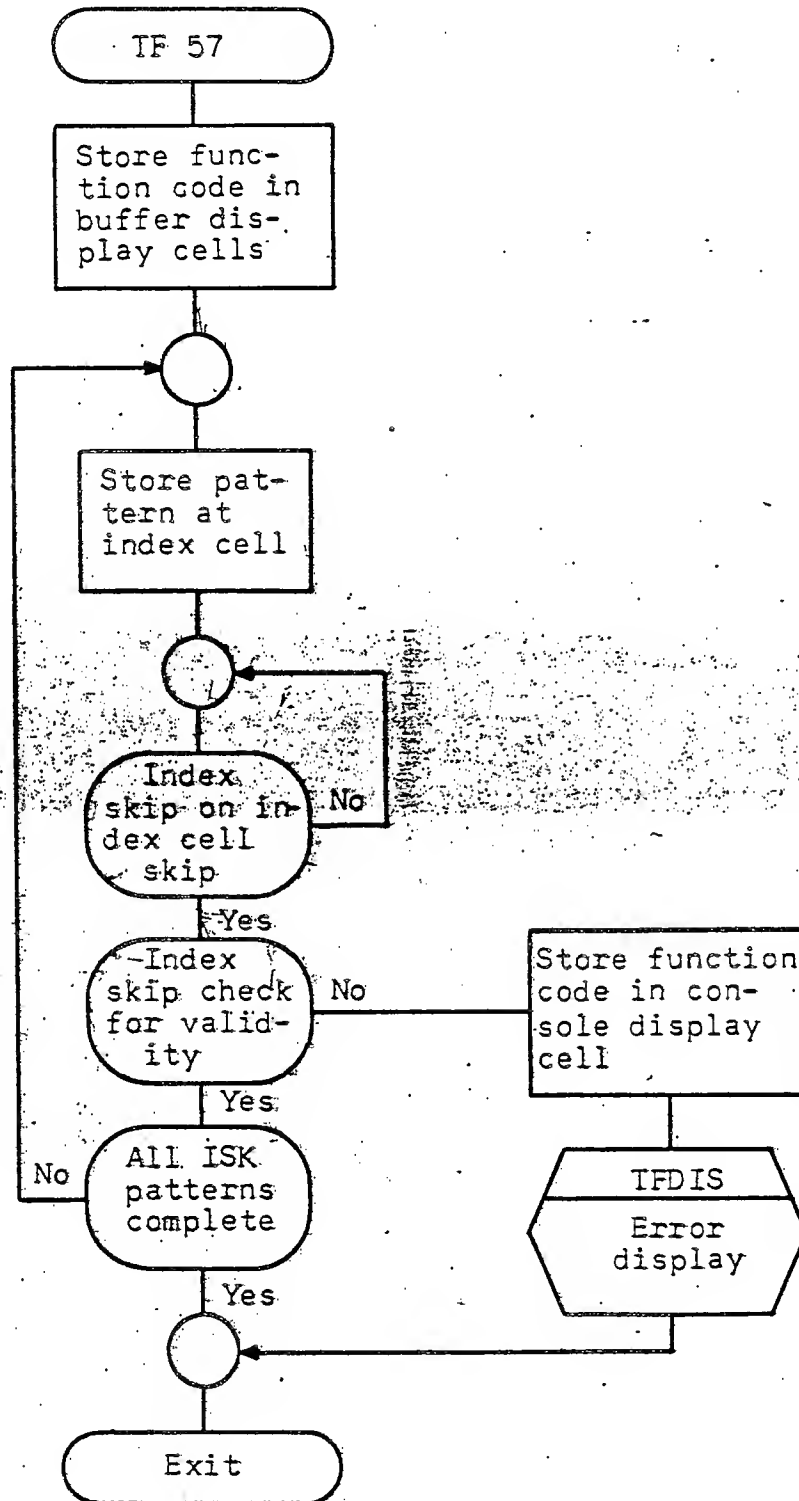COMA (EXEC)
TFDIS – Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY

PROGRAM STOP 0 – correct information in AU
incorrect information in AL
function code (57xxxx) in CO

PROGRAM SKIP 4 – set for console error display only
not set for error typeout (Function
Code 57)

PROGRAM SKIP 0 – not set to coninue test
set – recycle subroutine (TF57)

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SPECIFICATION SHEET

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SPECIFICATION SYMBOL
SB-10163

```
          ╭──────────────╮
          │     TF 57     │
          ╰──────────────╯
                 │
         ┌───────────────┐
         │ Store func-   │
         │ tion code in  │
         │ buffer dis-   │
         │ play cells    │
         └───────────────┘
                 │
                ( ) ◄───────────────┐
                 │                  │
         ┌───────────────┐          │
         │ Store pat-    │          │
         │ tern at       │          │
         │ index cell    │          │
         └───────────────┘          │
                 │                  │
                ( ) ◄──────────┐    │
                 │             │    │
          ╭──────────────╮     │    │
          │   Index      │ No  │    │
          │ skip on in-  │─────┘    │
          │ dex cell     │          │
          │   skip       │          │
          ╰──────────────╯          │
                 │ Yes              │
          ╭──────────────╮    ┌──────────────┐
          │  Index       │ No │ Store function│
          │ skip check   │───►│ code in con-  │
          │ for valid-   │    │ sole display  │
          │    ity       │    │ cell          │
          ╰──────────────╯    └──────────────┘
                 │ Yes              │
          ╭──────────────╮    ╱──────────────╲
     No   │  All ISK     │    │    TFDIS      │
    ┌─────│ patterns     │    ├──────────────┤
    │     │ complete     │    │    Error      │
    │     ╰──────────────╯    │   display     │
    │            │ Yes        ╲──────────────╱
    │           ( ) ◄─────────────────┘
    │            │
    │     ╭──────────────╮
    │     │     Exit      │
    │     ╰──────────────╯
    └────────────────────────────────►
```

TF57:   INDEX SKIP

SPECIFICATION SYMBOL
SB-10163

TITLE: TF60 - JUMP A UPPER EQUAL ZERO TO Y. (60xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF60   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: FWS modified by TLR   DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 18

DESCRIPTION:

This subroutine checks the performance of the Jump A Upper Equal
Zero to Y command. A shift count is set up and AU is cleared.
A JPAUZ command is initiated and executed. Validity is checked
by entering AU with a test-pattern constant and attempting
another 60 command. At this time AU is not equal to zero, there-
fore, no jump should take place. If no jump takes place, AU is
left shifted one place and an Index Skip back to the JPAUZ
command takes place. The subroutine repeats this process until
the Index Skip indicates the completion of the 22nd AU left
shift without an error. At this time the subroutine exits to
the executive routine (COMA). If any of the validity checks
detect an error, AU will contain the shifted pattern, and the
routine exits to the display routine. If PROGRAM STOP 0 is set,
CO will contain the function code, and the error may be
evaluated. AL will not contain an error display. Upon return
to this subroutine (TF60), an exit is made to the executive
routine (COMA) to check for continuing the program or the re-
cycling of this subroutine.

SPECIFICATION SYMBOL
SB-10163

TITLE: TF60

INPUT PARAMETERS (Listed Sequentially):

COMA

TEST PATTERNS
TPAT1   000000
TPAB1   000001
TSH   000022

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1

BUFF2

TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA (EXEC)

TSDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY

PROGRAM STOP 0 - shifted pattern in AU
no display in AL
function code (60xxxx) in CO

PROGRAM SKIP 4 - set for console error display only
not set for error typeout (Function
Code 60)

PROGRAM SKIP 0 - not set to continue test
set to recycle subroutine (TF60)

SPECIFICATION SYMBOL
SB-10163

```
        ( TF60 )

   ┌──────────────┐                    (A)
   │ Store func-  │
   │ tion code    │              ┌──────────────┐
   │ in display   │              │    TFDIS      │
   │ cells        │              ├──────────────┤
   └──────────────┘              │    Error     │
                                 │   display    │
   ┌──────────────┐              └──────────────┘
   │ Setup shift  │
   │ count 22     │                    (B)
   └──────────────┘

   ┌──────────────┐
   │              │
   │  Clear AU    │
   │              │
   └──────────────┘

     ( AU ZERO )──No──(A)
          │
         Yes
   ┌──────────────┐
   │ Enter AU     │
   │ with pat-    │
   │ tern         │
   │ (000001)     │
   └──────────────┘

          ○◄──────────────────────┐
          │                        │
   (A)─Yes─( AU ZERO )             No
                │                   │
               No            ( Shift count 0 )
   ┌──────────────┐                 │
   │ LSH  AU 1X   │────►            Yes
   └──────────────┘                 │
                                    (B)

                              ( Exit )
```
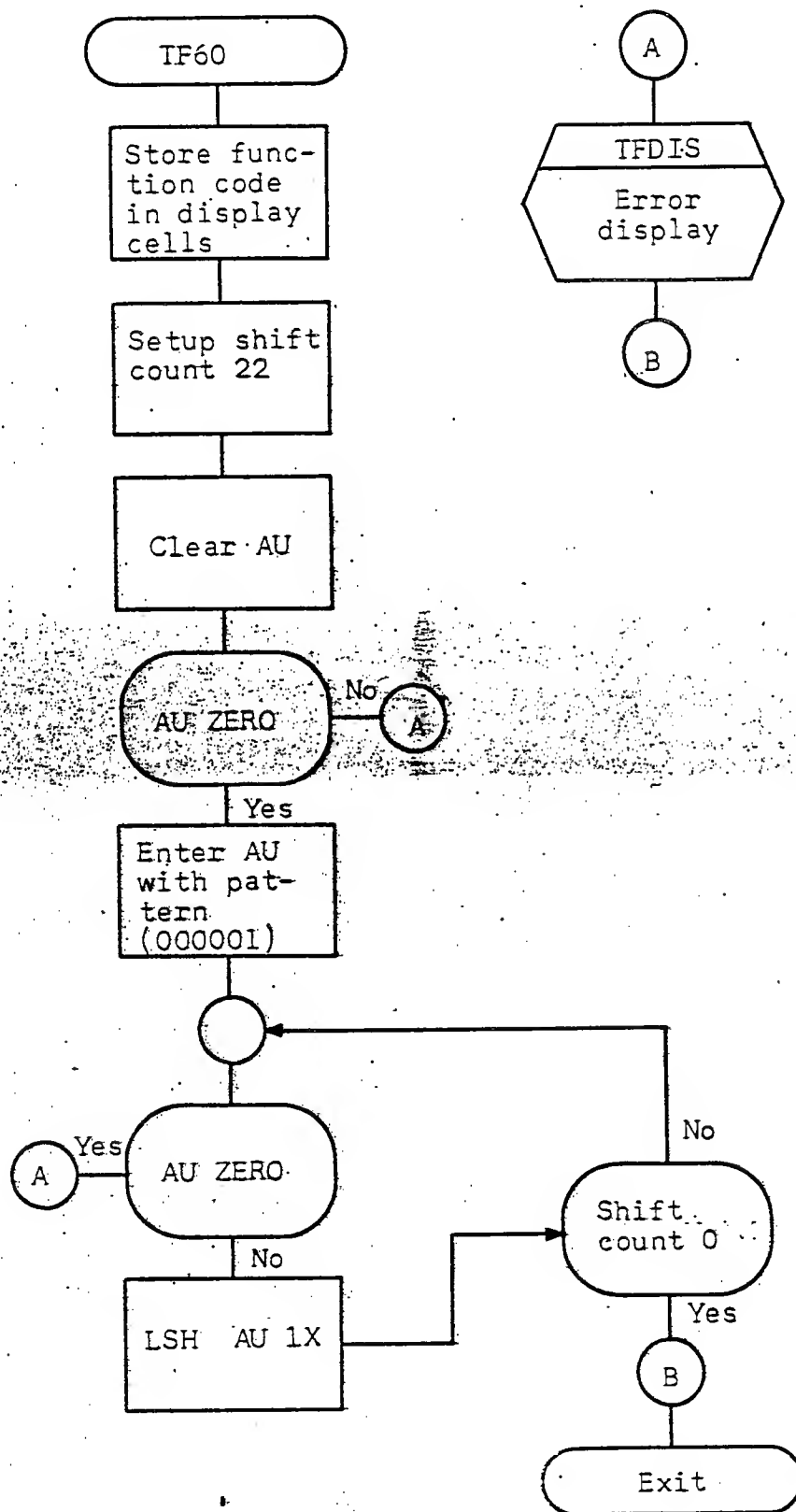
TF60.: JUMP AU ZERO TO Y   60XXXXX
                                  Y

SPECIFICATION SYMBOL
SB-10163

TITLE: TS60 - ROUND AU (506000)

DECK IDENTIFIER: FACT

CS-1 LABEL: TS60   KEY: _____   IS LABEL DUPLICATE? No

PROGRAMMER: FWS modified by TLR   DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 31

DESCRIPTION:

This subroutine checks the performance of the Round AU command.
AU and AL are entered with two, different, test-pattern constants.
A RND command is then executed. Validity is then checked by
comparing the result to the proper test pattern. If correct,
AU is entered with a different, test-pattern constant. Another
RND command is executed and validity is checked again. This
sequence is repeated again, and then an exit is made to the
executive routine (COMA). If an error is detected by the validity
checks, AU will contain the correct pattern, AL the incorrect
pattern, and an exit is made to the display subroutine. With
PROGRAM STOP 0 set, CO will contain the function code and the
error may be evaluated. Upon return to this subroutine (TS60)
an exit is made to the executive routine (COMA) in order to
determine whether to continue with the program or recycle this
subroutine.

SPECIFICATION SYMBOL
SB-10163

TITLE: TS60

INPUT PARAMETERS (Listed Sequentially):
COMA

TEST PATTERNS	
TPAT	777777
TPAT1	000000
TPAB2	400000
TCO3	377777

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1

BUFF2

BUFF3

BUFF4

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):
COMA (EXEC)

ISDIS - Error Display

SYSTEM DATA REFERENCES:

**ALARMS AND/OR REMARKS:**
ERROR DISPLAY   PROGRAM STOP 0 set
correct pattern in AU
incorrect pattern in AL
function code (506000) in CO

PROGRAM SKIP 4 - set for console error display only
not set for error typeout (Function
Code 5060)

PROGRAM SKIP 0 not set - continue test; if set -
recycle subroutine (TS60)
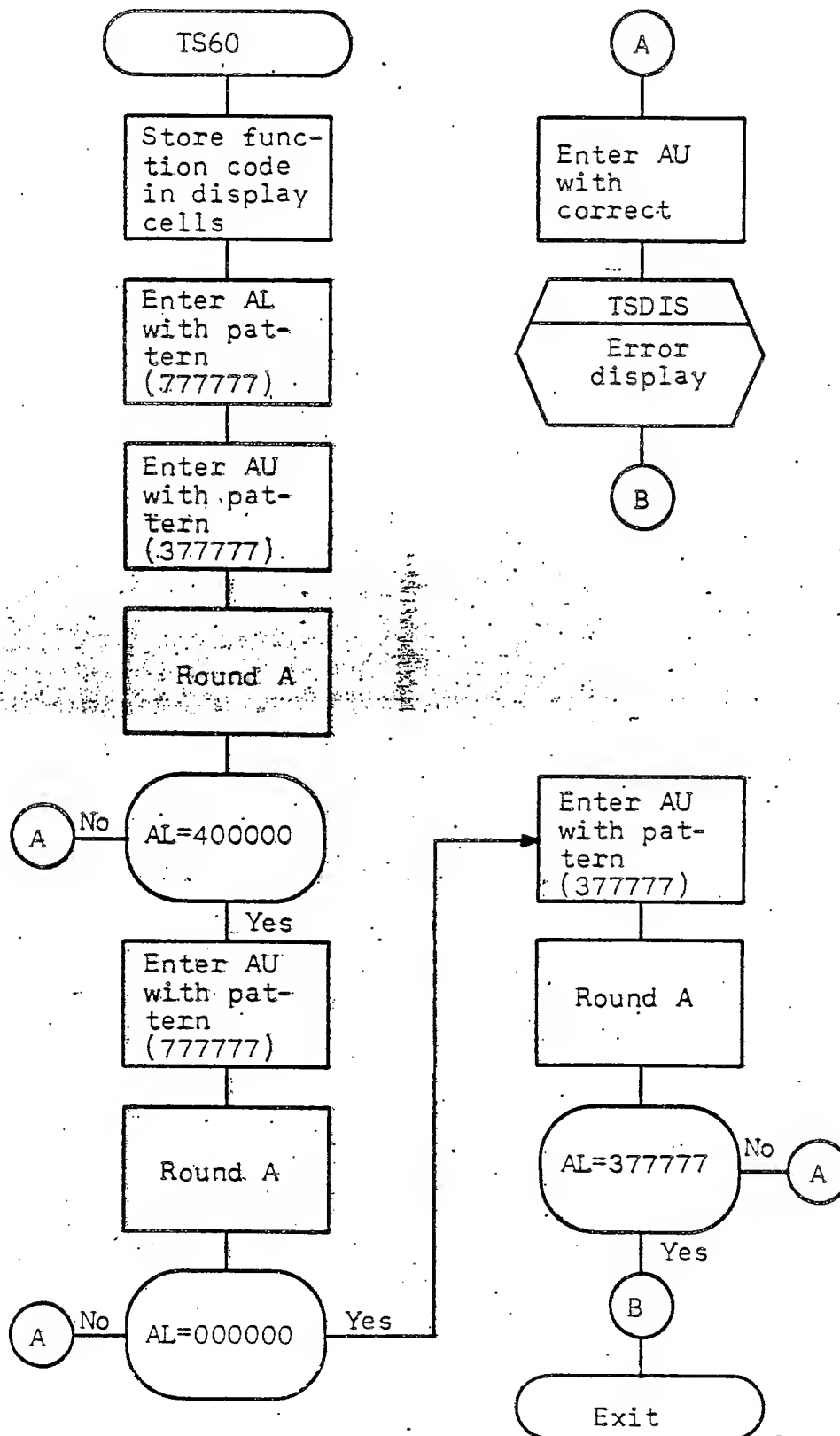
SPECIFICATION SYMBOL
SB-10163

```
        ( TS60 )                              ( A )

   +----------------+                    +----------------+
   | Store func-    |                    | Enter AU       |
   | tion code      |                    | with           |
   | in display     |                    | correct        |
   | cells          |                    +----------------+
   +----------------+                            |
           |                              /---------------\
   +----------------+                    |    TSDIS        |
   | Enter AL       |                    |    Error        |
   | with pat-      |                    |    display      |
   | tern           |                     \---------------/
   | (777777)       |                            |
   +----------------+                          ( B )
           |
   +----------------+
   | Enter AU       |
   | with pat-      |
   | tern           |
   | (377777)       |
   +----------------+
           |
   +----------------+
   |   Round A      |
   +----------------+
           |                              +----------------+
     No  /------\                         | Enter AU       |
   ( A )—| AL=400000 |                    | with pat-      |
         \------/                         | tern           |
           | Yes                          | (377777)       |
   +----------------+                     +----------------+
   | Enter AU       |                            |
   | with pat-      |                     +----------------+
   | tern           |                     |  Round A       |
   | (777777)       |                     +----------------+
   +----------------+                            |
           |                                /---------\  No
   +----------------+                      | AL=377777 |—( A )
   |   Round A      |                       \---------/
   +----------------+                            | Yes
           |                                   ( B )
     No  /---------\       Yes                    |
   ( A )—| AL=000000 |———————————+            ( Exit )
         \---------/
```

TS60:   Round A   506000

SPECIFICATION SYMBOL
SB-10163

TITLE: TF61 - JUMP IF A LOWER IS EQUAL TO ZERO (61xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF61   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: FWS modified by TLR   DATE: 8 December 1967

NUMBER OF L$_4$ OUTPUT INSTRUCTIONS: 18

DESCRIPTION:

This subroutine checks the performance of the Jump If AL Is Equal
to Zero command. A shift count is set up and AL is cleared. A
JPALZ command is initiated and executed. Validity is checked
by entering AL with a test-pattern constant and attempting
another JPALZ command. At this time AL is not equal to zero,
therefore, no jump should take place. If no jump takes place,
AL is left shifted one place and an Index Skip back to the Jump
if AL is zero command takes place. The subroutine repeats this
process until the Index Skip indicates the completion of the
22nd AL left shift without an error. At this time the sub-
routine exits to the executive routine (COMA). If any of the
validity checks detect an error, AL will contain the shifted
pattern, and an exit is made to the display subroutine. If
PROGRAM STOP 0 is set, CO will contain the function code, and
the error may be evaluated. AL will not contain an error
display. Upon return to this subroutine (TF61), an exit is
made to the executive routine (COMA) to check for continuing the
program or the recycling of this subroutine.

SPECIFICATION SYMBOL
SB-10163

TITLE: TF61

INPUT PARAMETERS (Listed Sequentially):

COMA

TEST PATTERN
TSH   000022

OUTPUT PARAMETERS (Listed Sequentially):
BUFF1
BUFF2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA (EXEC)

TFDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY - PROGRAM STOP 0 set
                no display in AU
                shifted pattern in AL
                function code (61xxxx) in CO
                PROGRAM SKIP 4 - set for console error display only
                                 not set for error typeout (Function
                                 Code 61)
                PROGRAM SKIP 0 not set - continue test; if set -
                                 recycle subroutine (TF61)

A-1975

SPECIFICATION SYMBOL
SB-10163
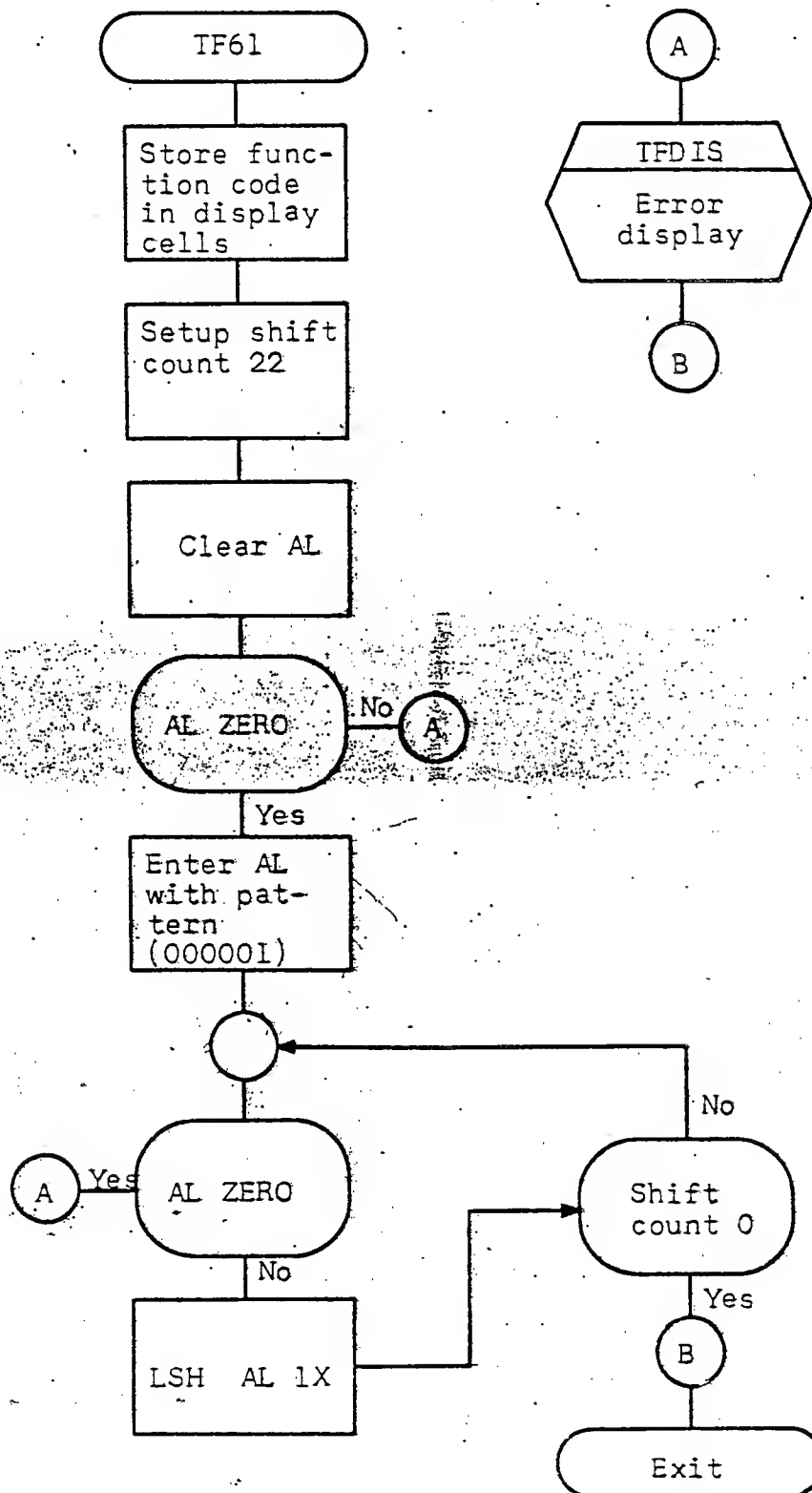
TF61: JUMP AL ZERO TO Y. 61XXXX/Y

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TITLE: TS61 - COMPLEMENT A LOWER (506100).

DECK IDENTIFIER: FACT

CS-1 LABEL: TS61   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: FWS modified by TLR   DATE: 8 December 1967

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 23

DESCRIPTION:

This subroutine checks the Complement A Lower command. AL is entered with a constant. A CPAL command is executed and validity is checked by executing an ADD AL plus one. Another CPAL command is executed and validity is checked by comparing AL to a test-pattern constant. If equal, an exit is made to the executive routine (COMA). If an error is detected by the validity checks, the correct pattern is entered into AU, AL will contain the incorrect pattern, and an exit is made to the display subroutine, where with PROGRAM STOP 0 set, the function code is displayed in CO, and the error may be evaluated. Upon return to this subroutine (TS61) an exit is made to the executive routine (COMA) to check for program continuance or the recycling of this subroutine.

SPECIFICATION SYMBOL
SB-10163

TITLE: TS61

INPUT PARAMETERS (Listed Sequentially):

COMA

TEST PATTERNS
TPAT1   000000
TPAB1+1   777776

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1

BUFF2

BUFF3

BUFF4

TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA (EXEC)

TSDIS — Error Display

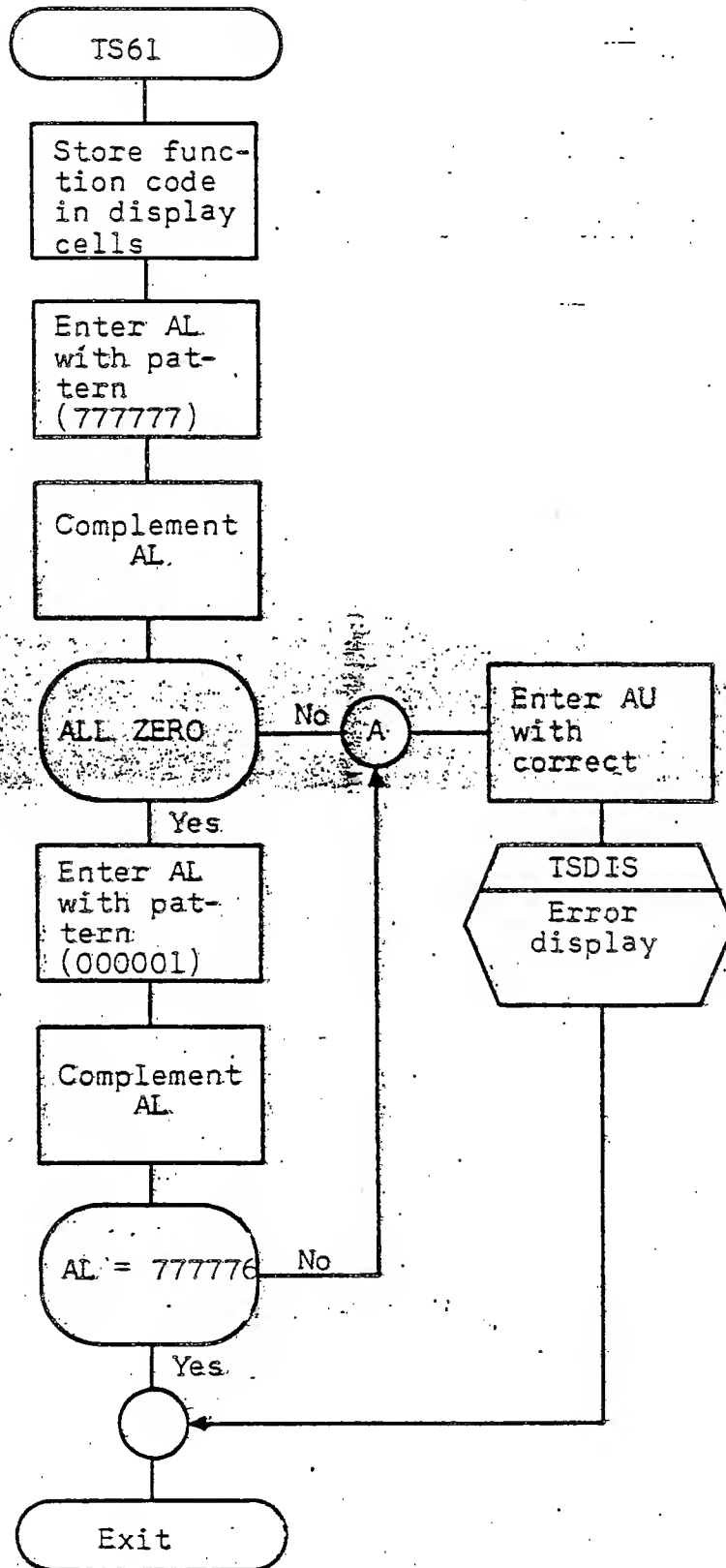SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY - PROGRAM STOP 0 set
          correct information in AU
          incorrect information in AL
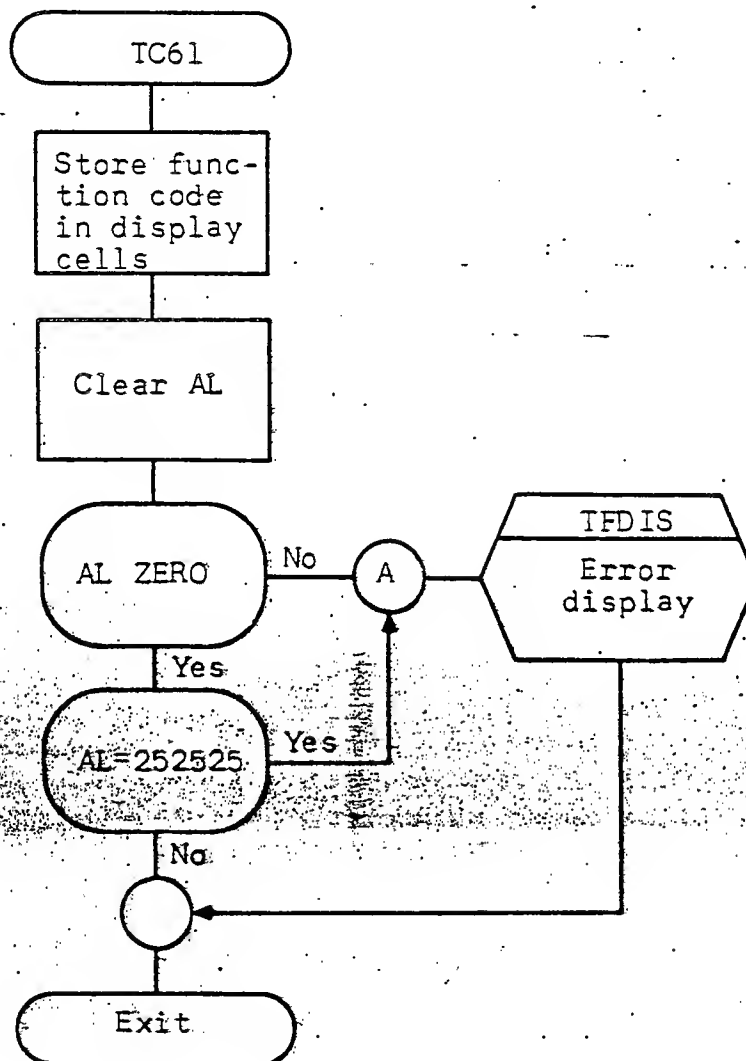   function code (506100) in CO
        PROGRAM SKIP 4 - set for console error display only
                  not set for error typeout (Function
                  Code 5061)
        PROGRAM SKIP 0 not set - continue test; if set -
                  recycle subroutine (TS61)

A-1975

```
                    ╭─────────────╮
                    │    TS61      │
                    ╰──────┬───────╯
                           │
                ┌──────────────────┐
                │ Store func-      │
                │ tion code        │
                │ in display       │
                │ cells            │
                └────────┬─────────┘
                ┌──────────────────┐
                │ Enter AL         │
                │ with pat-        │
                │ tern             │
                │ (777777)         │
                └────────┬─────────┘
                ┌──────────────────┐
                │ Complement       │
                │ AL               │
                │                  │
                └────────┬─────────┘
                    ╭────────────╮        ╭───╮      ┌──────────────┐
                    │            │   No   │ A │──────│ Enter AU     │
                    │ ALL ZERO   │────────│   │      │ with         │
                    │            │        ╰─┬─╯      │ correct      │
                    ╰──────┬─────╯          │        └──────┬───────┘
                          Yes              │               │
                ┌──────────────────┐       │        ╔══════════════╗
                │ Enter AL         │       │        ║   TSDIS      ║
                │ with pat-        │       │        ╟──────────────╢
                │ tern             │       │        ║   Error      ║
                │ (000001)         │       │        ║   display    ║
                └────────┬─────────┘       │        ╚══════╤═══════╝
                ┌──────────────────┐       │               │
                │ Complement       │       │               │
                │ AL               │       │               │
                └────────┬─────────┘       │               │
                    ╭────────────╮    No   │               │
                    │ AL = 777776 │────────┘               │
                    ╰──────┬─────╯                         │
                          Yes                              │
                         ╭───╮◄──────────────────────────┘
                         ╰─┬─╯
                    ╭──────────────╮
                    │    Exit      │
                    ╰──────────────╯
```

TS61: COMPLEMENT AL   506100

SPECIFICATION SYMBOL
SB-10163

TITLE: TC61 - JUMP COMPARE EQUAL TO Y (61xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TC61   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: FWS modified by TLR   DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 15

DESCRIPTION:

This subroutine checks the Jump Compare Equal to Y command. AL is entered with a test-pattern constant, and a compare of AL and an associated test-pattern is executed. A Jump if equal is executed and if proper the next pattern is entered into AL, compared to an associated test pattern, and another Jump if equal is executed. If correct an exit is made to the executive routine (COMA). If an error is detected due to an improper execution, AU will not contain a display, AL will contain the correct pattern, and an exit is made to the display subroutine, where with PROGRAM STOP 0 set, CO will contain the function code, and the error may be evaluated. Upon return to this subroutine (TC61) an exit is made to the executive routine (COMA) to check for program continuance or the recycling of this subroutine.

SPECIFICATION SYMBOL
SB-10163

TITLE: TC61

INPUT PARAMETERS (Listed Sequentially):

COMA

TEST PATTERNS	
TPAT1	000000
TPAT1+1	000000
TPAT2	252525

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1

BUFF2

TEX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA (EXEC)

TFDIS - Error Display
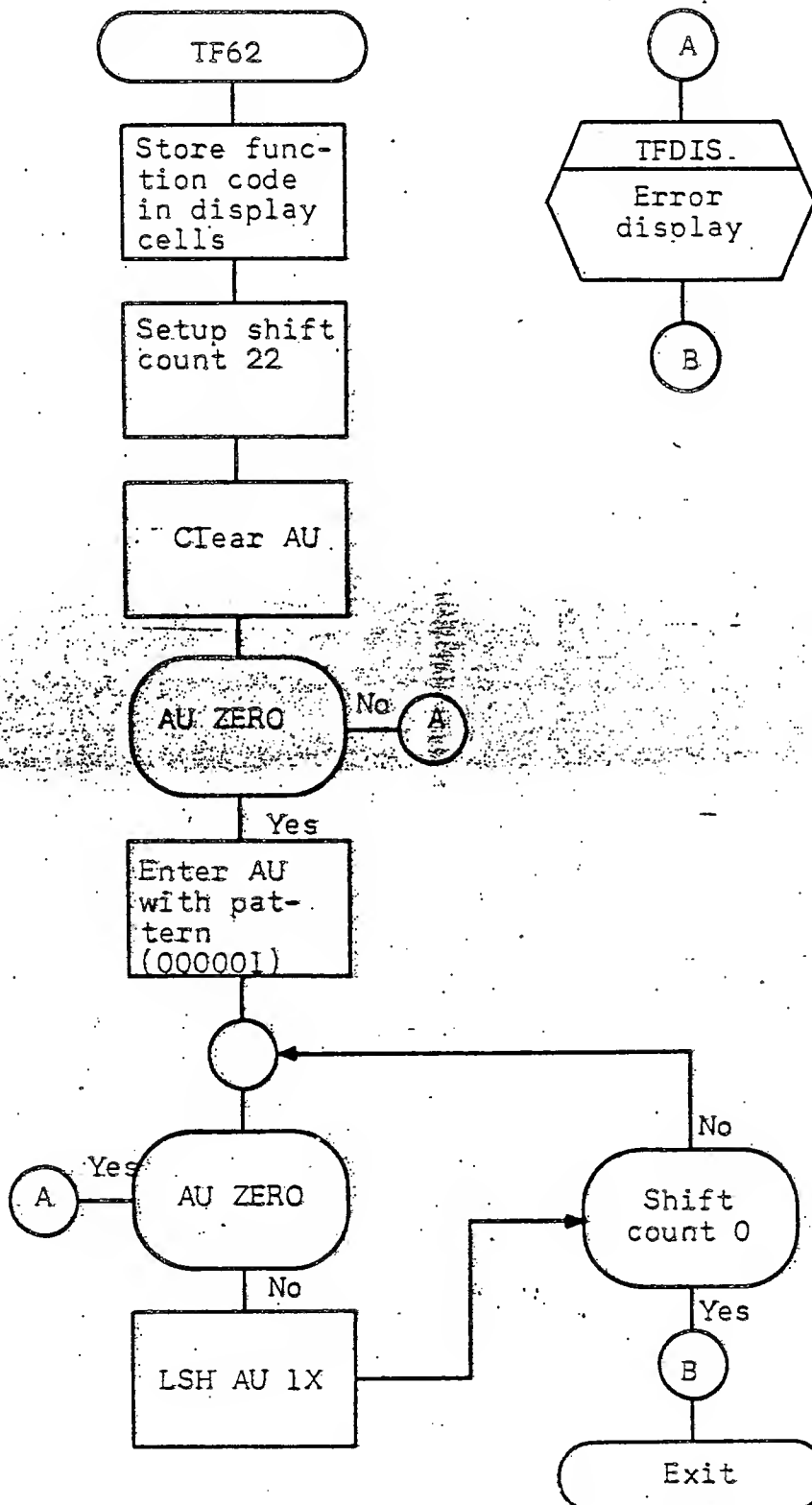
SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY - PROGRAM STOP 0 set

    no display in AU

    correct pattern in AL

    function code (61xxxx) in CO

    PROGRAM SKIP 4 - set for console error display only
                not set for error typeout (Function
                Code 61)

    PROGRAM SKIP 0 not set - continue test; if set -
                recycle subroutine (TC61)

```
           ┌─────────────┐
          (    TC61       )
           └──────┬──────┘
           ┌──────┴──────┐
           │ Store func- │
           │ tion code   │
           │ in display  │
           │ cells       │
           └──────┬──────┘
           ┌──────┴──────┐
           │             │
           │  Clear AL   │
           │             │
           └──────┬──────┘
                  │
            ╭─────┴─────╮    No    ⊙      ╱▔▔▔▔▔▔▔▔╲
            │  AL ZERO  │─────────( A )───│  TFDIS   │
            ╰─────┬─────╯                 │  Error   │
                  │ Yes                   │ display  │
            ╭─────┴─────╮    Yes          ╲▁▁▁▁▁▁▁▁╱
            │ AL=252525 │──────────┘
            ╰─────┬─────╯
                  │ No
                 ( )◄──────────────────────┘
                  │
           ┌──────┴──────┐
          (    Exit       )
           └─────────────┘
```

TC61:   JUMP COMPARE EQ TO Y

61XXXX
   Y

TITLE: TF62 - JUMP A UPPER NOT ZERO (62xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF62   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: FWS modified by TLR   DATE: 8 December 1967

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 20

DESCRIPTION:

This subroutine checks the Jump A Upper Not Zero command. A
shift count is set up and AU is entered with a test-pattern
constant. A JPAUNZ command is executed and if proper AU is
entered with the next test-pattern. Another JPAUNZ command is
executed and if correct A Upper is left shifted one place followed
by the JPAUNZ. The above is then repeated with an Index skip;
the Index Skip is repeated until all patterns have been checked.
If all executions are proper, an exit is made to the executive
routine (COMA). If an error is detected AU will contain the
shift pattern. AL will not contain a display, and an exit
is made to the display subroutine. With PROGRAM STOP 0 set,
CO will contain the function code and the error may be evaluated.
Upon return to this subroutine (TF62) an exit is made to the
executive routine to check for continuing the test or recycling
this subroutine.

SPECIFICATION SYMBOL
SB-10163

TITLE: TF62

INPUT PARAMETERS (Listed Sequentially):

COMA

TEST PATTERNS
TPAT1   000000
TPAB1   000001
TSH   000022

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1

BUFF2

TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):
COMA (EXEC)

TFDIS — Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY - PROGRAM STOP 0 set
                shifted pattern in AU
                no display in AL
                function code (62xxxx) in CO
                PROGRAM SKIP 4 - set for console error display only
                                 not set for error typeout (Function
                                 Code 62)
                PROGRAM SKIP 0 - not set to continue test
                                 set to recycle subroutine (TF62)

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(TF62)

Store func-
tion code
in display
cells

Setup shift
count 22

CTear AU

AU ZERO — No → (A)

Yes

Enter AU
with pat-
tern
(000001)

(A) — Yes — AU ZERO

No

LSH AU 1X

(A)

TFDIS.
Error
display

(B)

No

Shift
count 0

Yes

(B)

Exit

TF62: JUMP·AU NOT ZERO TO Y   62XXXXX
                                      Y

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SPECIFICATION SYMBOL
SB-10163

TITLE: TS62 - COMPLEMENT A UPPER (506200)

DECK IDENTIFIER: FACT

CS-1 LABEL: TS62   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: FWS modified by TLR   DATE: 8 December 1967

NUMBER OF L_4 OUTPUT INSTRUCTIONS: _____ 23 _____

DESCRIPTION:

This subroutine checks the Complement A Upper command. AU is
entered with a test-pattern and a CPAU command is executed. If
AU is equal to zero the execution was proper and AU is stored
with a different test pattern. Another CPAU command is executed
and validity is checked by entering AL with an associated test
pattern, and executing a compare mask. If the CPAU command
executions are proper, an exit is made to the executive routine
(COMA). If an error is detected AU will contain the incorrect
pattern, AL the correct pattern, and an exit is made to the
display subroutine. With PROGRAM STOP Q set, CO will contain
the function code, and the error may be evaluated. Upon return
to this subroutine (TS62) an exit is made to the executive
routine to check for program continuance or the recycling of this
subroutine.

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SPECIFICATION SHEET

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SPECIFICATION SYMBOL
SB-10163

TITLE: TS62

INPUT PARAMETERS (Listed Sequentially):
COMA

TEST PATTERNS
TPAT   777777
TPAB1   000001

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1

BUFF2

BUFF3

BUFF4

TEX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA (EXEC)

TSDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:
ERROR DISPLAY - PROGRAM STOP set
                incorrect information in AU
                correct information in AL
                function code (506200) in CO
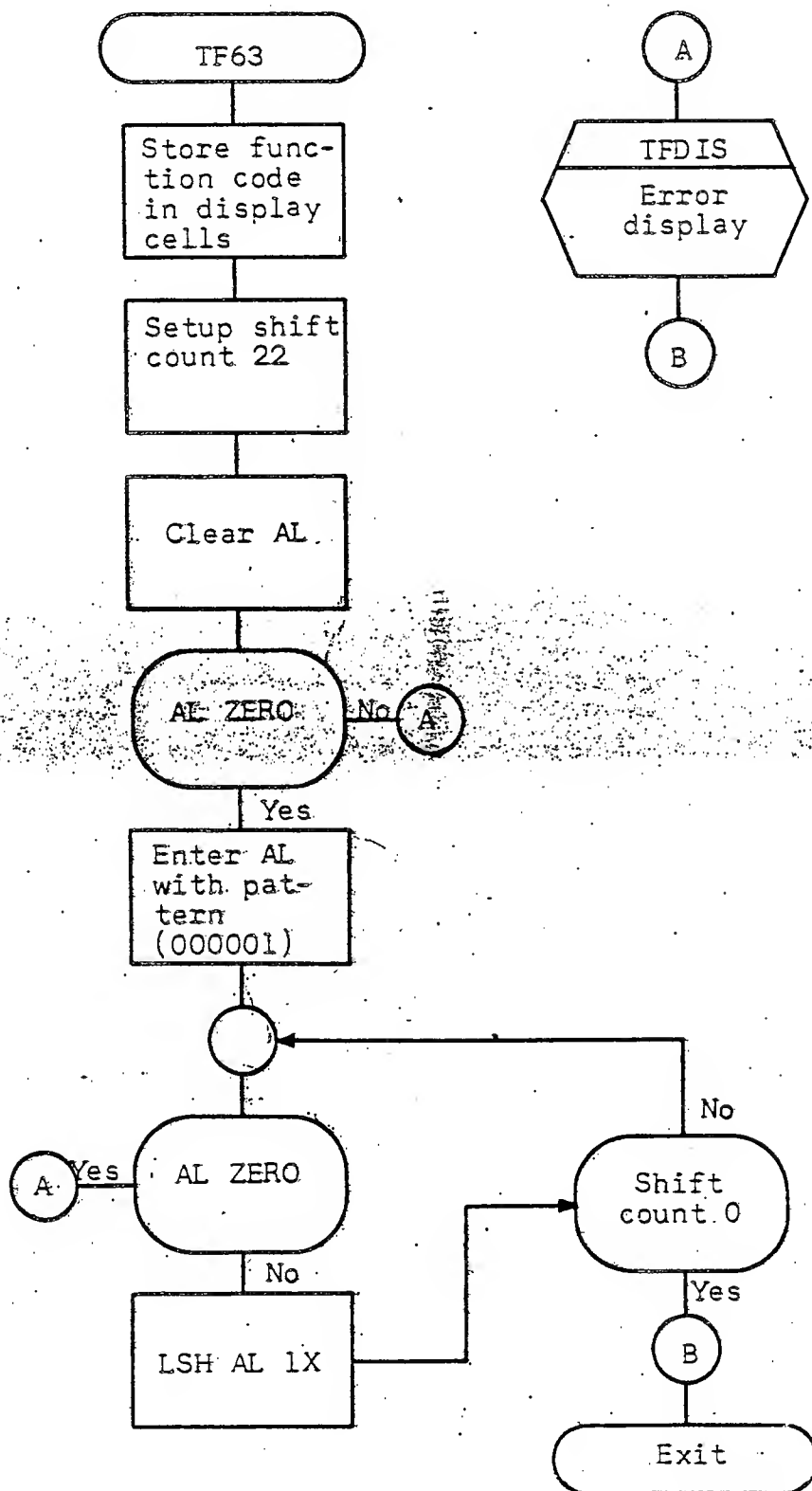   PROGRAM SKIP 4 - set for console error display only
                                 not set for error typeout (Function
                                 Code 5062)
                PROGRAM SKIP 0 not set - continue test; if set -
                                         recycle subroutine (TS62)

```
                    ( TS62 )
                       |
         +---------------------------+
         | Store func-               |
         | tion code                 |
         | in display                |
         | cells                     |
         +---------------------------+
                       |
         +---------------------------+
         | Enter AU                  |
         | with pat-                 |
         | tern                      |
         | (777777)                  |
         +---------------------------+
                       |
         +---------------------------+
         | Complement                |
         | AU                        |
         +---------------------------+
                       |
              (  AU ZERO  ) ----No---( A )----+
                       |                      |
                     Yes                +------------------+
         +---------------------------+  | Enter AL         |
         | Enter AU                  |  | with             |
         | with pattern              |  | correct          |
         | (000001)                  |  +------------------+
         +---------------------------+           |
                       |                  /  TSDIS  \
         +---------------------------+   (  Error    )
         | Complement                |    \ display /
         | AU                        |          |
         +---------------------------+          |
                       |                        |
              ( AU = 777776 ) ---No----+        |
                       |               |        |
                     Yes               |        |
                      |                 \       |
                     ( ) <--------------------------+
                      |
                   ( Exit )
```
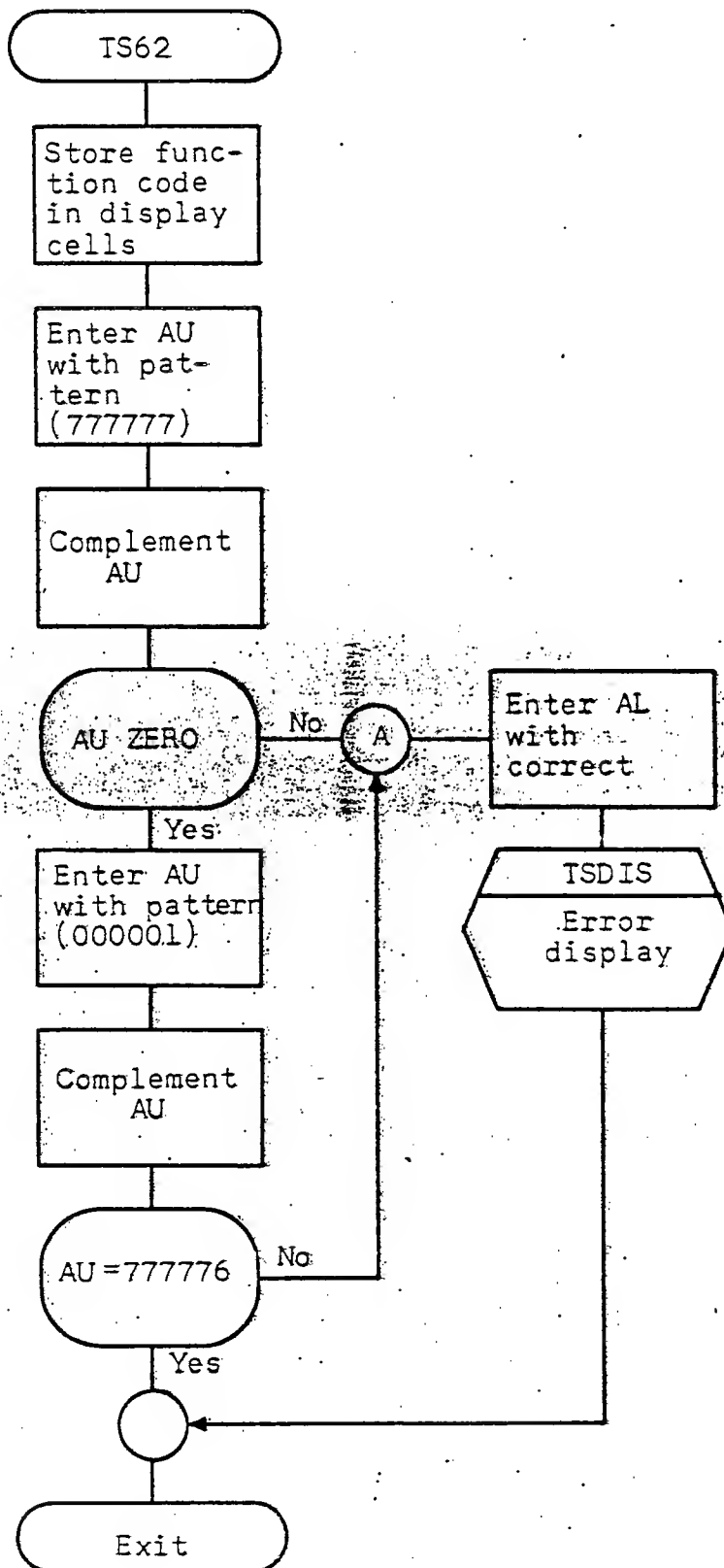
TS62:   COMPLEMENT AU 506200

SPECIFICATION SYMBOL
SB-10163

TITLE: TF63 - JUMP A LOWER NOT ZERO (63xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF63   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: FWS modified by TLR   DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 20

DESCRIPTION:

This subroutine checks the Jump A Lower Not Zero command. A
shift count is set up and AL is entered with a constant. A
JPALNZ command is executed and if proper AL is entered with the
next constant. Another Jump if A Lower is not equal to zero
command is executed and if proper AL is left shifted one place.
An Index Skip command is executed, and the above sequence is
repeated until all patterns have been checked. If all executions
were correct an exit is then made to the executive routine (COMA).
If an error is detected on any of the validity checks, AU will
contain no display, AL the shifted pattern and an exit is made
to the display subroutine. With PROGRAM STOP 0 set, CO will
contain the function code, and the error may be evaluated. Upon
return to this subroutine (TF63) an exit is made to the executive
routine (COMA) to check for program continuance or the recycling
of this subroutine.

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SPECIFICATION SYMBOL
SB-10163

TITLE: TF63

INPUT PARAMETERS (Listed Sequentially):

COMA

TEST PATTERN
TSH   000022

OUTPUT PARAMETERS (Listed Sequentially):
BUFF1

BUFF2

TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA (EXEC)

TFDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY - PROGRAM STOP 0 set
                no display in AU
                shifted pattern in AL
                function code (63xxxx) in CO
            PROGRAM SKIP 4 - set for console error display only
                             not set for error typeout (Function
                             Code 63)
            PROGRAM SKIP 0 not set - continue test; if set -
                             recycle subroutine (TF63)

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SPECIFICATION SYMBOL
SB-10163

TF63

Store func-
tion code
in display
cells

Setup shift
count 22

Clear AL

AL ZERO — No → (A)

Yes

Enter AL
with pat-
tern
(000001)

( )

(A) Yes — AL ZERO

No

LSH AL 1X

Shift
count 0

No

Yes

(B)

Exit

(A)

TFDIS
Error
display

(B)

TF63: JUMP AL NOT ZERO TO Y   63$\frac{XXXX}{Y}$,

SPECIFICATION SYMBOL
SB-10163

TITLE: TS63 - COMPLEMENT A (506300)

DECK IDENTIFIER: FACT

CS.1 LABEL: TS63   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: FWS modified by TLR   DATE: 8 December 1967

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 26

DESCRIPTION:

This subroutine checks the Complement A command. AL and AU are
entered with the same, test-pattern constant. A CPA command is
executed and validity checked by comparing AL to an associated,
test-pattern constant. If correct, a Compare Mask using
another, test-pattern constant is used to check AU. Another
CPA command is executed and validity again checked. An exit
is made to the executive routine (COMA). If an error is detected
by any of the validity checks, AU and AL will contain patterns
that should be equal, and an exit is made to the display sub-
routine. With PROGRAM STOP 0 set, CO will contain the function
code, and the error may be evaluated. Upon return to this
subroutine (TS63) an exit is made to the executive routine (COMA)
to check for program continuance or the recycling of this sub-
routine.

A-1974

SPECIFICATION SYMBOL
SB-10163

TITLE: TS63

INPUT PARAMETERS (Listed Sequentially):
COMA

TEST PATTERNS
TPAT   777777
TPAT2   252525
TPAT3   525252

OUTPUT PARAMETERS (Listed Sequentially):
BUFF1
BUFF2
BUFF3
BUFF4
TFX

ABNORMAL EXITS (Listed Sequentially):

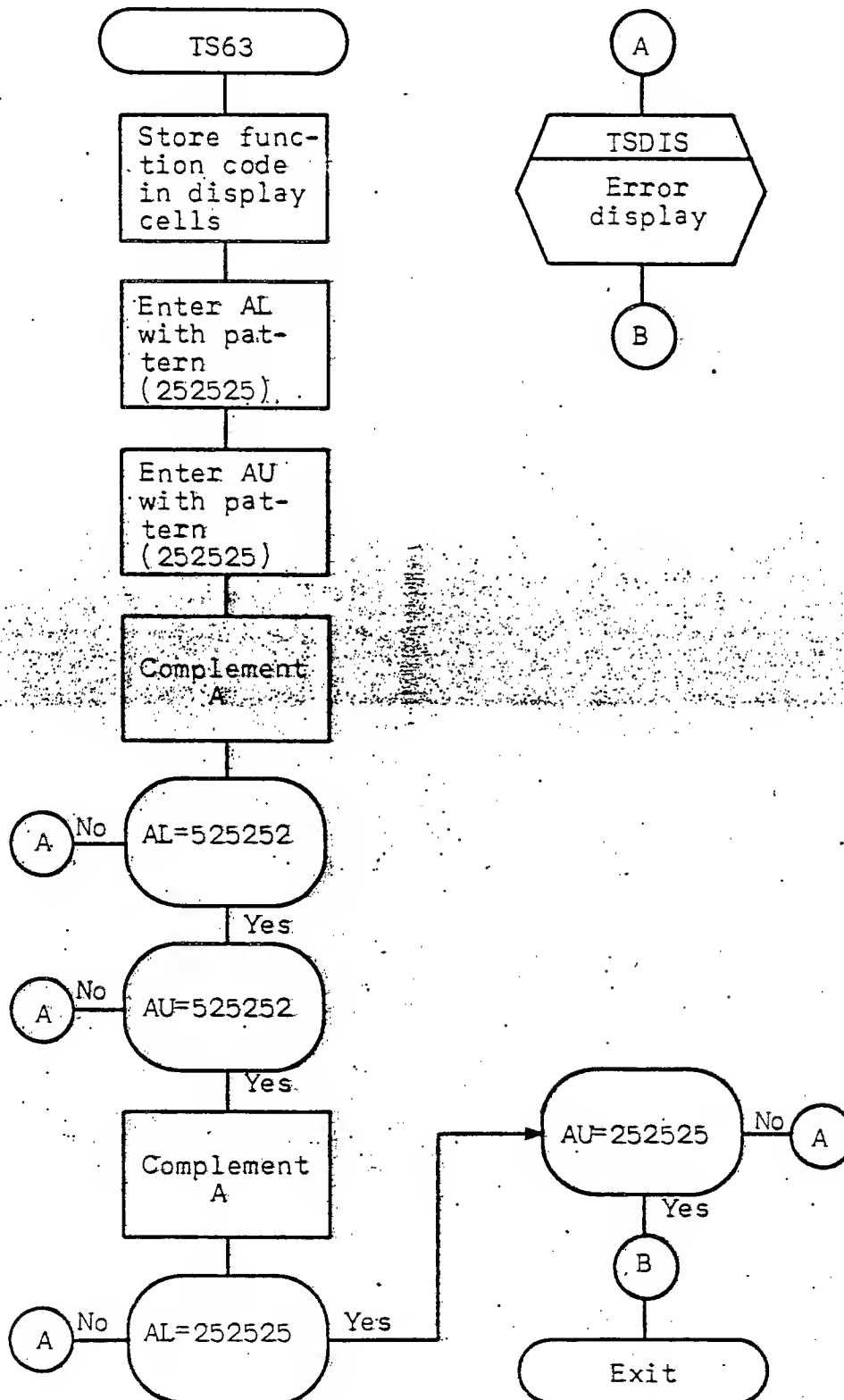NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):
COMA (EXEC)
TSDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:
ERROR DISPLAY - PROGRAM STOP 0 set
                equal patterns in AU and AL
                function code (506300) in CO
               PROGRAM SKIP 4 - set for console error display only
                                not set for error typeout (Function
                                Code 5063)
               PROGRAM SKIP 0 not set - continue test; if set -
                                recycle subroutine (TS63)

A-1975

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SPECIFICATION SYMBOL
SB-10163

```
        ┌──────────────┐                      ( A )
        │    TS63       │                       │
        └──────┬───────┘                 ┌──────┴──────┐
               │                         │   TSDIS     │
        ┌──────┴───────┐                 ├─────────────┤
        │ Store func-  │                 │   Error     │
        │ tion code    │                 │   display   │
        │ in display   │                 └──────┬──────┘
        │ cells        │                        │
        └──────┬───────┘                      ( B )
        ┌──────┴───────┐
        │ Enter AL     │
        │ with pat-    │
        │ tern         │
        │ (252525)     │
        └──────┬───────┘
        ┌──────┴───────┐
        │ Enter AU     │
        │ with pat-    │
        │ tern         │
        │ (252525)     │
        └──────┬───────┘
        ┌──────┴───────┐
        │ Complement   │
        │    A         │
        └──────┬───────┘
```

(A) —No— AL=525252

Yes

(A) —No— AU=525252

Yes

Complement A → AU=252525 —No— (A)

Yes

(A) —No— AL=252525 —Yes— (B)

Exit

TS63: COMPLEMENT A 506300

SPECIFICATION SYMBOL
SB-10163

TITLE: TC63 - JUMP NOT EQUAL (63xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TC63   KEY: _____   IS LABEL DUPLICATE? No

PROGRAMMER: EWS modified by TLR   DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: _____ 15 _____

DESCRIPTION:

This subroutine checks the Jump Not Euqal command (Function Code
63). A pattern is entered into A Lower and a Compare AL to Y
is executed to set the Unequal Compare Designator. The JPNOT
command (Function Code 63) is executed and if proper a jump will
be made to the next portion of the subroutine. In this portion
a Compare AL Plus Y is executed with an equal-image pattern that
is contained in A Lower. The Unequal Compare Designator is cleared
and the Jump Not Equal command (Function Code 63) is again
executed. A proper execution will result in executing the
next command which is an exit to the executive routine (COMA)
for continuance of the test. If either execution of the Jump
Not Equal command is improper an exit is made to the display
subroutine (TFDIS) where the correct pattern is contained in A
Lower. Upon returning to this subroutine (TC63) an exit is
made to the executive routine (COMA) to check for continuance of
the test or recycling of this subroutine.

A-1974

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PROGRAM DATA PAGE (Cont)

SPECIFICATION SYMBOL
SB-10163

TITLE: TC63

INPUT PARAMETERS (Listed Sequentially):
COMA

TEST PATTERNS
TPAT1   000000
TPAB1   000001

OUTPUT PARAMETERS (Listed Sequentially):
BUFF 1
BUFF 2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):
COMA (EXEC)

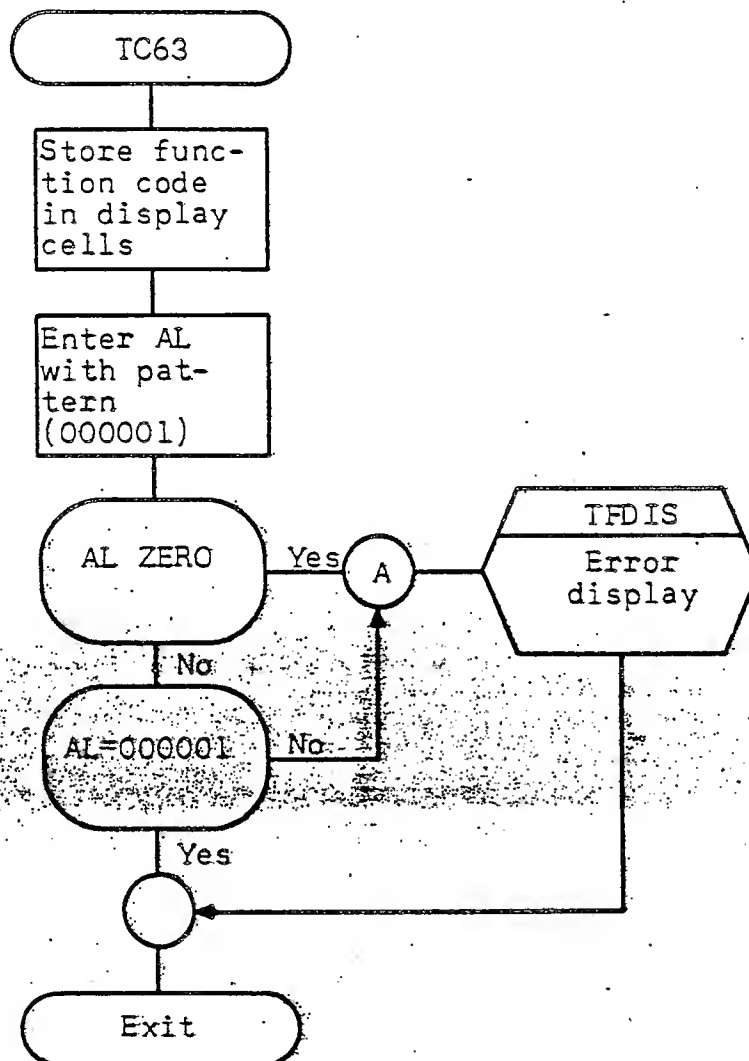TFDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:
ERROR DISPLAY - PROGRAM STOP 0 set
     No Display in AU
     Correct information in AL
     Function Code (63xxxx) in CO
     PROGRAM SKIP 4 - set for console error display only
                not set for error typeout (Function
                Code 63)
     PROGRAM SKIP 0 not set - continue test; if set -
                recycle subroutine (TC63)

A-1975

SPECIFICATION SYMBOL
SB-10163

```
        ( TC63 )
           |
    +----------------+
    | Store func-    |
    | tion code      |
    | in display     |
    | cells          |
    +----------------+
           |
    +----------------+
    | Enter AL       |
    | with pat-      |
    | tern           |
    | (000001)       |
    +----------------+
           |
      ( AL ZERO ) --Yes--> (A)
           |                       +----------------+
          No                       |     TFDIS       |
           |                       |     Error       |
      ( AL=000001 ) --No-->        |    display      |
           |                       +----------------+
          Yes                             |
           O  <-----------------------------+
           |
        ( Exit )
```

TC63:   JUMP NOT EQUAL TO Y

$$63\underline{XXXX} \over Y$$

SPECIFICATION SYMBOL
SB-10163

TITLE: TF64 - JUMP A UPPER POSITIVE (64xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF64   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: EWS modified by TLB   DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 14

DESCRIPTION:

This subroutine checks the Jump A Upper Positive command. AU
is entered with a test-pattern constant, and a JPAUP command is
executed if the execution is valid AU is entered with the next
test pattern, and another executing JPAUP command. A proper
execution will result in an exit to the executive routine (COMA).
If an error is detected by the validity checks, AU will contain
the correct pattern, AL will not contain a display, and an exit
is made to the display subroutine. With PROGRAM STOP 0 set, CO
will contain the function code, and the error may be evaluated.
Upon return to this subroutine (TF64) an exit is made to the
executive routine (COMA) to check for program continuance or the
recyling of this subroutine.

SPECIFICATION SYMBOL
SB-10163

TITLE: TF64

INPUT PARAMETERS (Listed Sequentially):
COMA

TEST PATTERNS
TPAT6   707070
TPAB3   312132

OUTPUT PARAMETERS (Listed Sequentially):
BUFF 1
BUFF 2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA (EXEC)
TFDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:
ERROR DISPLAY - PROGRAM STOP 0 set
                Correct information in AU
                No Display in AL
                Function Code (64xxxx) in CO
                PROGRAM SKIP 4 - set for console error display only
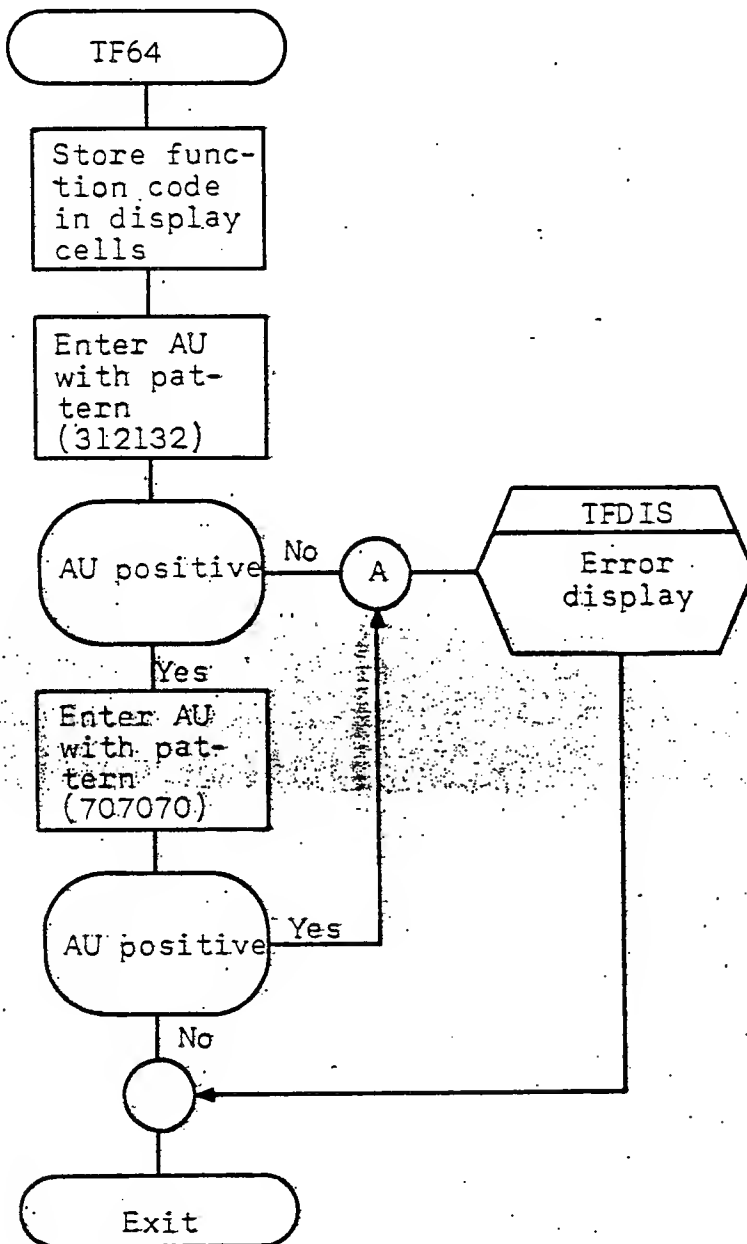   not set for error typeout (Function
                                 Code 64)
                PROGRAM SKIP 0 not set - continue test
                                 set - recycle subroutine
                                 (TF64)

A-1975

SPECIFICATION SYMBOL
SB-10163.

```
        ( TF64 )
           |
   +----------------+
   | Store func-    |
   | tion code      |
   | in display     |
   | cells          |
   +----------------+
           |
   +----------------+
   | Enter AU       |
   | with pat-      |
   | tern           |
   | (312132)       |
   +----------------+
           |
   ( AU positive )  --No-->  (A)  -->  / TFDIS  \
           |                           | Error   |
          Yes                          | display |
   +----------------+                  \         /
   | Enter AU       |                       |
   | with pat-      |                       |
   | tern           |                       |
   | (707070)       |                       |
   +----------------+                       |
           |                                |
   ( AU positive )  --Yes--> (up to A)      |
           |                                |
          No                                |
          ( ) <----------------------------+
           |
        ( Exit )
```

TF64: JUMP AU POSITIVE TO Y   64XXXX
                                     Y

SPECIFICATION SYMBOL
SB-10163

TITLE: TF65 - JUMP A LOWER POSITIVE (65xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF65   KEY: _____   IS LABEL DUPLICATE? No

PROGRAMMER: FWS modified by TLR   DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 14

DESCRIPTION:

This routine checks the Jump A Lower Positive command. AL is
entered with a test pattern. A JPALP command is executed and if
proper AL is entered with the next test pattern. Another JPALF
is executed and if proper an exit to the executive routine (COMA)
is made. If an error is detected on the validity checks, AU will
not contain a display, AL will contain the correct pattern, and
an exit is made to the display subroutine, where with PROGRAM STOP
0 set, CO will contain the function code, and the error may be
evaluated. Upon return to this subroutine (TF65) an exit is made
to the exectuive routine (COMA) to check for program continuance
or the recycling of this subroutine.

SPECIFICATION SYMBOL
SB-10163

TITLE: TF65

INPUT PARAMETERS (Listed Sequentially):

COMA

TEST PATTERNS
TPAT6   707070
TPAB3   312132

OUTPUT PARAMETERS (Listed Sequentially):
BUFF1
BUFF2
TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):
COMA (EXEC)
TFDIS - Error Display
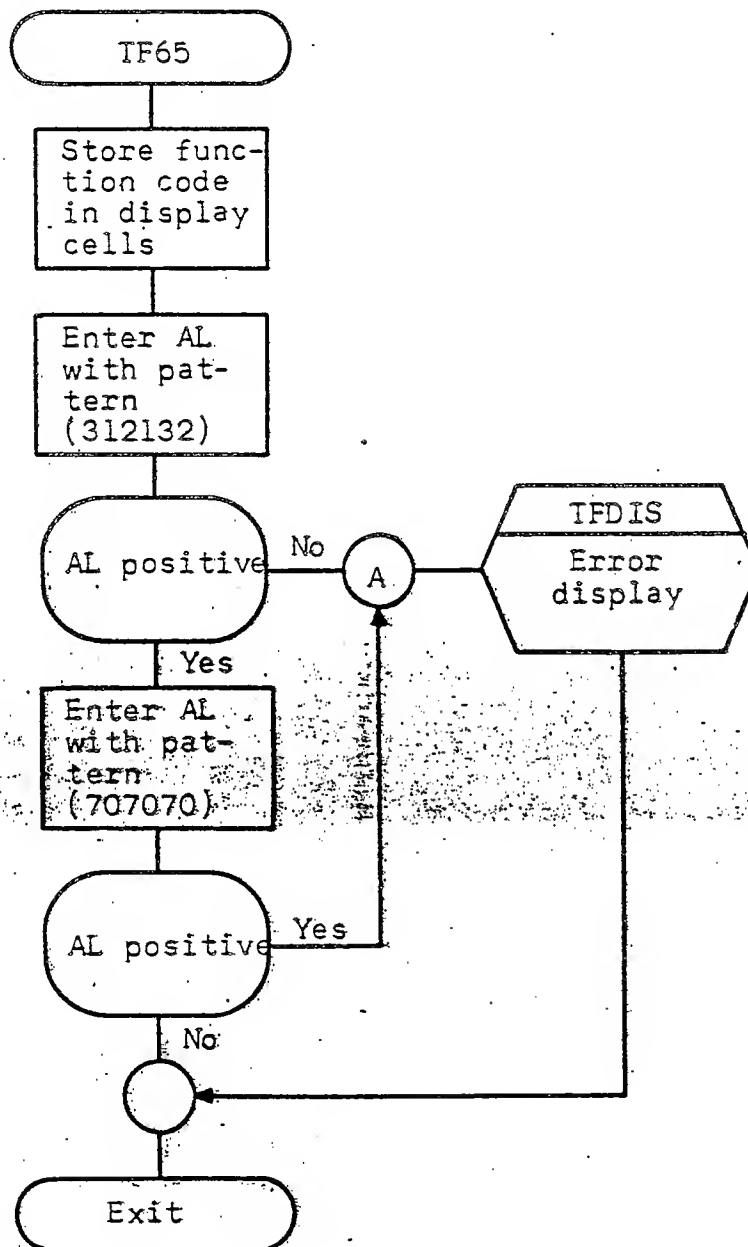
SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:
ERROR DISPLAY - PROGRAM STOP 0 set
                No Display in AU
                Correct pattern in AL
                Function Code (65xxxx) in CO
                PROGRAM SKIP 4 - set for console error display only
                                 not set for error typeout (Function
                                 Code 65)
                PROGRAM SKIP 0 not set - continue test; if set -
                                 recycle subroutine (TF65)

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SPECIFICATION SHEET

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SPECIFICATION SYMBOL
SB-10163

TF65

Store function code in display cells

Enter AL with pattern (312132)

AL positive — No → (A) → TFDIS Error display

Yes

Enter AL with pattern (707070)

AL positive — Yes

No

Exit

TF65:   JUMP AL POSITIVE TO Y   65 XXXX
        ————
          Y

SPECIFICATION SYMBOL
SB-10163

TITLE: TC65 - JUMP Y LESS THAN OR EQUAL A LOWER (65xxxx)

DECK IDENTIFIER: _____

CS-1 LABEL: TC65 . KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: FWS modified by TLR DATE: 8 December 1967

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 17

DESCRIPTION:

This subroutine checks the Jump Y Less Than or Equal A Lower
command. AU and AL are entered with two, different test patterns.
A Compare Mask is executed using a third test pattern. A
JPMLEQ command is executed and if proper AL is entered with a
different test pattern. Again a Compare Mask, and 65 command are
executed. If the execution is proper an exit is made to the
executive routine (COMA). If an error is detected, AU will
contain the Compare Mask, AL will contain the correct pattern
and an exit is made to the display subroutine. With PROGRAM STOP
0 set, CO will contain the function code, and the error may be
evaluated. Upon return to this subroutine (TC65) an exit is
made to the executive routine (COMA) to check for program
continuance or the recycling of this subroutine.

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PROGRAM DATA PAGE (Cont)

SPECIFICATION SYMBOL
SB-10163

TITLE: TC65

INPUT PARAMETERS (Listed Sequentially):

COMA

TEST PATTERNS
TPAT   777777
TPAT1   000000
TPAT2   252525
TPAT3   525252
TPAB1   000001

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1

BUFF2

TEX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):
COMA (EXEC)

TEDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY - PROGRAM STOP 0 set
                Compare Mask in AU
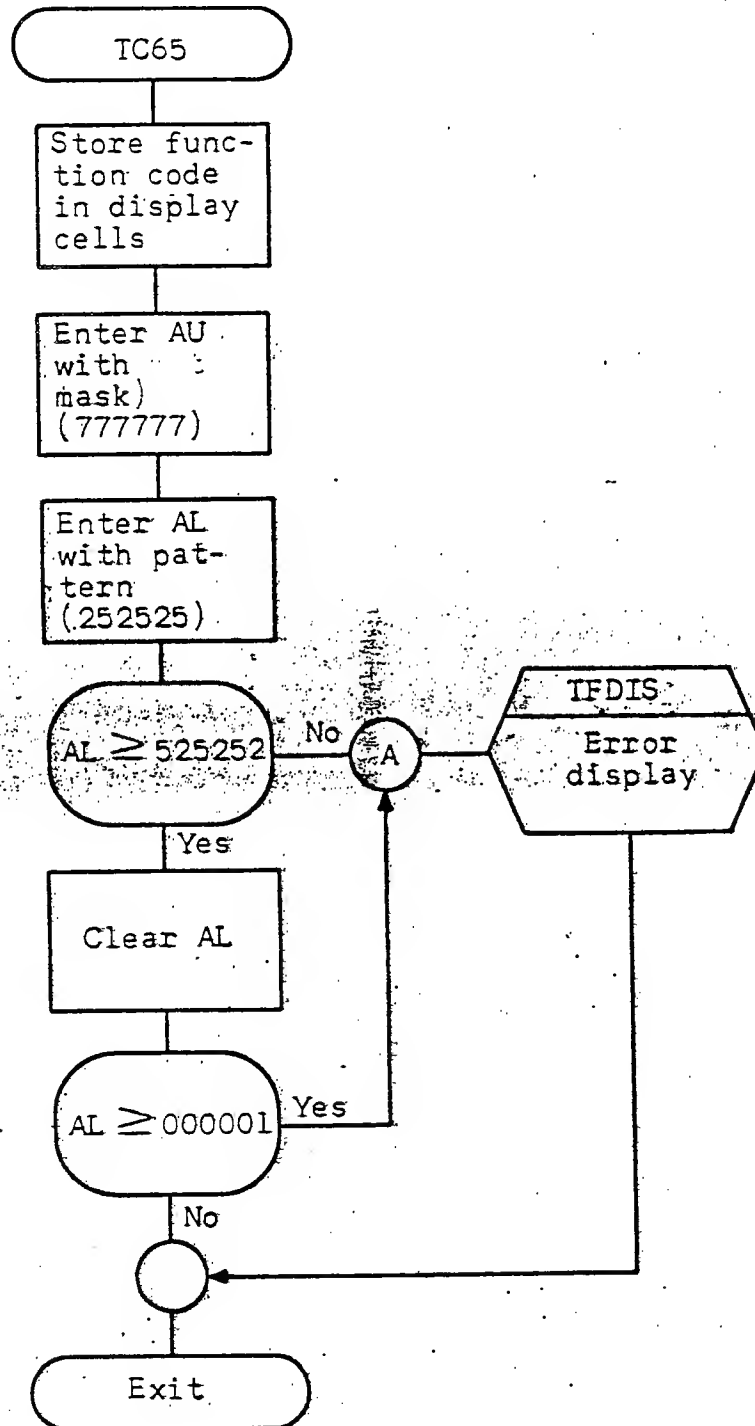   Correct pattern in AL
                Function Code (65xxxx) in CO
                PROGRAM SKIP 4 - set for console error display only
                                 not set for error typeout
                                 (Function Code 65)
                PROGRAM SKIP 0 not set - continue test
                                 set - recycle subroutine (TC65)

A-1975

```
            ╭─────────────╮
            │    TC65      │
            ╰──────┬──────╯
            ┌──────┴───────┐
            │ Store func-  │
            │ tion code    │
            │ in display   │
            │ cells        │
            └──────┬───────┘
            ┌──────┴───────┐
            │ Enter AU     │
            │ with         │
            │ mask)        │
            │ (777777)     │
            └──────┬───────┘
            ┌──────┴───────┐
            │ Enter AL     │
            │ with pat-    │
            │ tern         │
            │ (.252525)    │
            └──────┬───────┘
```

AL ≥ 525252   No   (A)   TFDIS
                                Error display

Yes

Clear AL

AL ≥ 000001   Yes

No

Exit

TC65:   JUMP TO Y IF MEMORY EQUAL TO OR LESS THAN AL

65XXXX
Y

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PROGRAM DATA PAGE

SPECIFICATION SYMBOL
SB-10163

TITLE: TF66 - JUMP A UPPER NEGATIVE (66xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF66 _____ KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: FWS modified by TLR _____ DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 14

DESCRIPTION:

This subroutine checks the Jump A Upper Negative command. AU is
entered with a test pattern. A JPAUNG command is executed and if
proper AU is entered with a different test pattern. Another
JPAUNG command is executed and if proper an exit is made to the
executive routine (COMA). If an error is detected by the
validity checks, AU will contain the correct pattern, AL will not
contain a display and an exit is made to the display subroutine.
With PROGRAM STOP 0 set, CO will contain the function code, and
the error may be evaluated. Upon return to this subroutine (TF66)
an exit is made to the executive routine (COMA) to check for
program continuance or the recycling of this subroutine.

| SPECIFICATION SYMBOL |
| SB-10163 |

TITLE: TF66

INPUT PARAMETERS (Listed Sequentially):

TEST PATTERNS
TPAT6   707070
TPAB3   312132

OUTPUT PARAMETERS (Listed Sequentially):
BUFF1

BUFF2

TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):
COMA (EXEC)

TFDIS - Error Display

SYSTEM DATA REFERENCES:

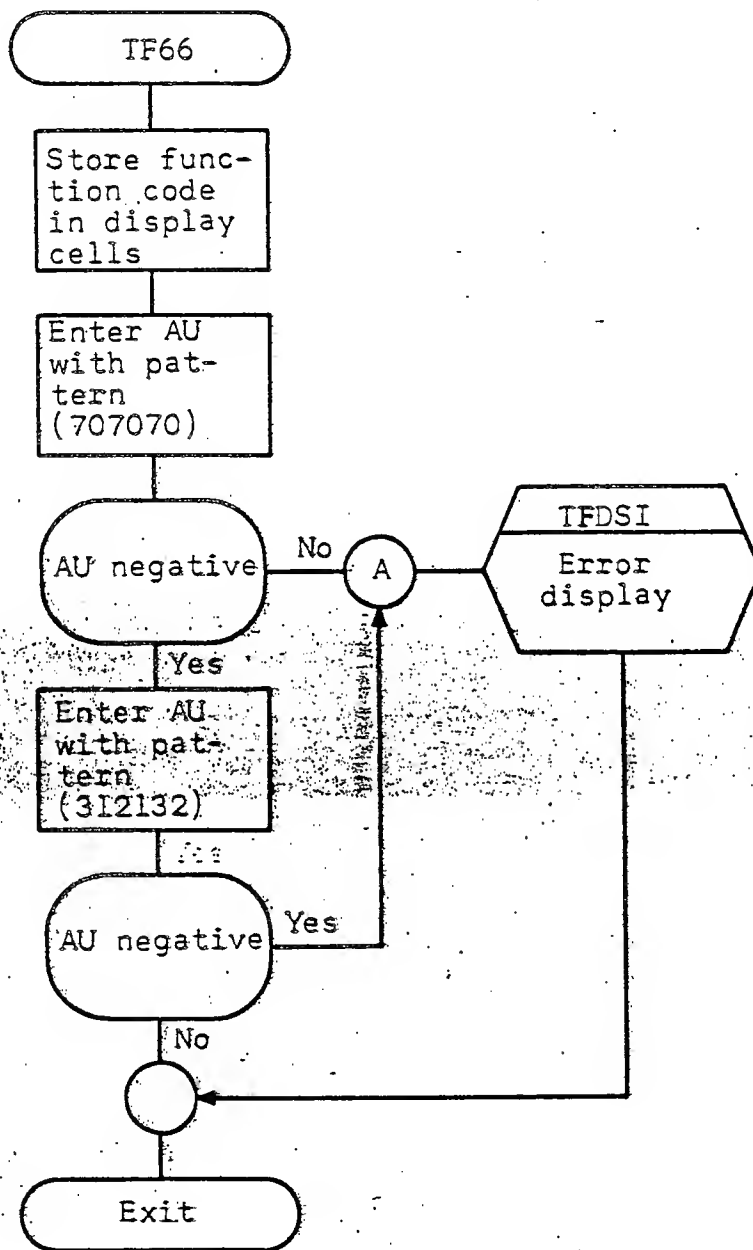ALARMS AND/OR REMARKS:
ERROR DISPLAY -   PROGRAM STOP 0 set
                  Correct pattern in AU
                  No Display in AL
                  Function Code (65xxxx) in CO
                  PROGRAM SKIP 4 - set for console error display only
                               not set for error typeout (Function
                               Code 66)
                  PROGRAM SKIP 0 not set - continue test; if set -
                               recycle subroutine (TF66)

SPECIFICATION SYMBOL
SB-10163

TF66

Store func-
tion code
in display
cells

Enter AU
with pat-
tern
(707070)

AU negative — No → (A)

TFDSI

Error
display

Yes

Enter AU
with pat-
tern
(312132)

AU negative — Yes

No

Exit

TF66:   JUMP AU NEGATIVE TO Y   66 XXXX
                                      Y

SPECIFICATION SYMBOL
SB-10163

TITLE: TF67 - JUMP A LOWER NEGATIVE (67xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF67   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: FWS modified by TLR   DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 14

DESCRIPTION:

This subroutine checks the Jump A Lower Negative command. AL is
entered with a test pattern. A JPALNG command is then executed
and if proper the next test pattern is entered into AL checked
by entering AL with a different test pattern. Another JPALNG
command is executed and if correct an exit is made to the
executive routine (COMA). If an error is detected by the
validity checks, AU will not contain a display, AL will contain
the correct pattern, and an exit is made to the display sub-
routine. With PROGRAM STOP O set, CO will contain the function
code, and the error may be evaluated. Upon return to this sub-
routine (TF67) an exit is made to the executive routine (COMA)
to check for program continuance or the recycling of this sub-
routine.

SPECIFICATION SYMBOL
SB-10163

TITLE: TF67

INPUT PARAMETERS (Listed Sequentially):

TEST PATTERNS
TPAT6   707070
TPAB3   312132

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1
BUFF2
TEX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA (EXEC)

TFDIS – Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:
ERROR DISPLAY – PROGRAM STOP 0 set
                No Display in AU
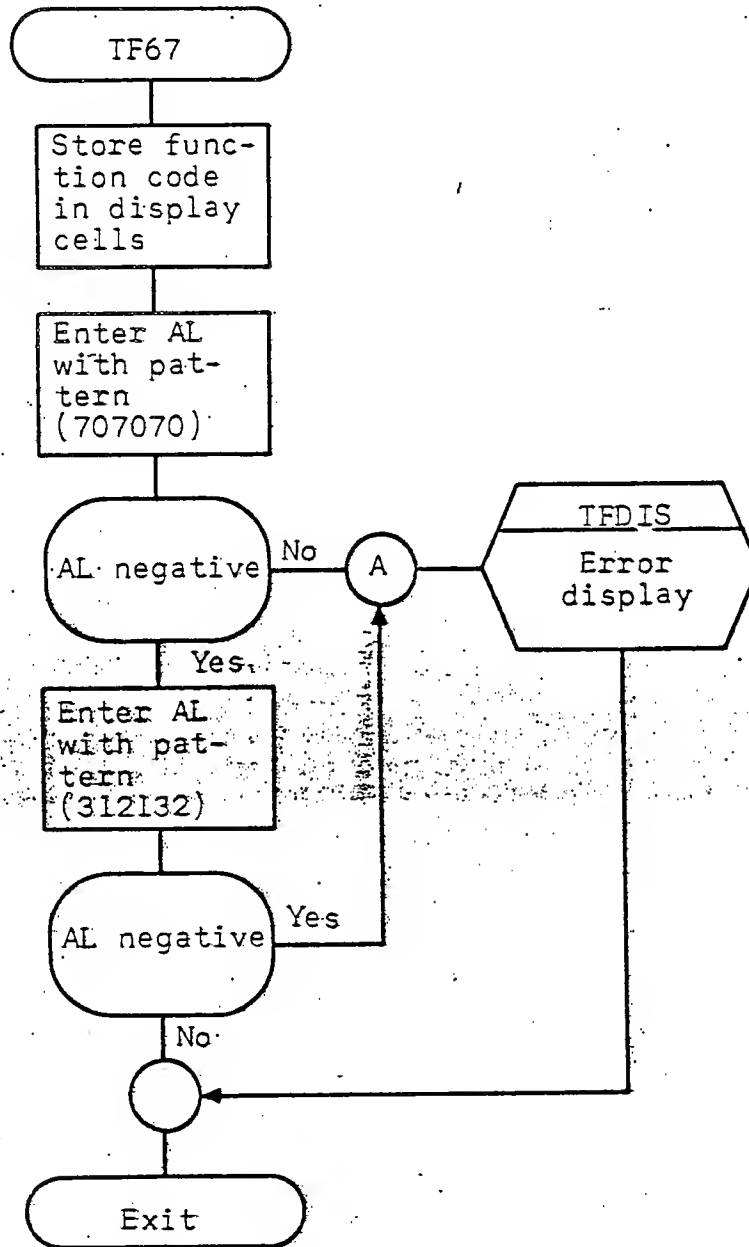   Correct information in AL
                Function Code (67xxxx) in CO
                PROGRAM SKIP 4 – set for console error display only
                                not set for error typeout (Function
                                Code 67)
                PROGRAM SKIP 0 not set – continue test; if set –
                                recycle subroutine (TF67)

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SPECIFICATION SYMBOL
SB-10163

```
        ┌──────────────┐
        │     TF67     │
        └──────┬───────┘
        ┌──────┴───────┐
        │ Store func-  │
        │ tion code    │
        │ in display   │
        │ cells        │
        └──────┬───────┘
        ┌──────┴───────┐
        │ Enter AL     │
        │ with pat-    │
        │ tern         │
        │ (707070)     │
        └──────┬───────┘
        ╭──────┴───────╮        ┌───────────────┐
        │              │   No   │    TFDIS      │
        │ AL negative  ├───(A)──┤    Error      │
        │              │        │    display    │
        ╰──────┬───────╯        └───────┬───────┘
            Yes │
        ┌──────┴───────┐
        │ Enter AL     │
        │ with pat-    │
        │ tern         │
        │ (312132)     │
        └──────┬───────┘
        ╭──────┴───────╮   Yes
        │ AL negative  ├────────┐
        ╰──────┬───────╯        │
            No │                │
             ( )◄───────────────┘
        ┌──────┴───────┐
        │    Exit      │
        └──────────────┘
```

TF67: JUMP AL NEGATIVE TO Y   67$\underline{XXXX}$
                                    $\cdot$Y

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PROGRAM DATA PAGE

SPECIFICATION SHEET

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SPECIFICATION SYMBOL
SB-10163

TITLE: TC67 - JUMP Y GREATER THAN A LOWER (67xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TC67   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: FWS modified by TLR   DATE: 8 December 1967

NUMBER OF L$_4$ OUTPUT INSTRUCTIONS: 17

DESCRIPTION:

This subroutine checks the Jump Y Greater Than A Lower command.
AU and AL are entered with different test patterns. A Compare
Mask is executed using a third test pattern. A JPMGR command
is then executed and if proper AL is entered with the next test
pattern. Again a Compare Mask, and JPMGR command are executed
and if proper an exit is made to the executive routine (COMA).
If an error is detected by the validity checks, AU will contain
the Compare Mask, AL will contain the correct pattern, and an
exit is made to the display subroutine. With PROGRAM STOP 0 set,
CO will contain the function code, and the error may be evaluated.
Upon return to this subroutine (TC67) an exit is made to the
executive routine (COMA) to check for program continuance or the
recycling of this subroutine.

SPECIFICATION SYMBOL
SB-10163

TITLE: TC67

INPUT PARAMETERS (Listed Sequentially):
COMA

TEST PATTERNS	
TPAT	777777
TPAT1	000000
TPAT6	707070
TPAT7	070707
TPAB1	000001

OUTPUT PARAMETERS (Listed Sequentially):

BUFF 1

BUFF 2

TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):
COMA (EXEC)

TFDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:
ERROR DISPLAY - PROGRAM STOP 0 set
             Compare Mask in AU
             Correct Information in AL
             Function Code (67xxxx) in CO
             PROGRAM SKIP 4 - set for console error display only
                          not set for error typeout (Function
                          Code 67)
             PROGRAM SKIP 0 not set - continue test; if set -
                          recycle subroutine (TC67)

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SPECIFICATION SHEET

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SPECIFICATION SYMBOL
SB-10163

```
                    ┌──────────────┐
                    │    TC67      │
                    └──────┬───────┘
                           │
                    ┌──────────────┐
                    │ Store func-  │
                    │ tion code    │
                    │ in display   │
                    │ cells        │
                    └──────┬───────┘
                           │
                    ┌──────────────┐
                    │ Enter AU     │
                    │ with mask    │
                    │ (777777)     │
                    └──────┬───────┘
                           │
                    ┌──────────────┐
                    │ Enter AL     │
                    │ with pat-    │
                    │ tern         │
                    │ (707070)     │
                    └──────┬───────┘
                           │
                ┌──────────────────┐  Yes   ┌───┐        ┌──────────────┐
                │  AL < 070707     ├───────▶│ A │        │    TFDIS     │
                └────────┬─────────┘        └─┬─┘        │ Error        │
                         │ No                 │          │ display      │
                ┌──────────────┐              │          └──────┬───────┘
                │ Enter AL     │              │                 │
                │ with pat-    │              │                 │
                │ tern         │              │                 │
                │ (000001)     │              │                 │
                └──────┬───────┘              │                 │
                       │                      │                 │
                ┌──────────────┐   No         │                 │
                │  AL < ZERO   ├──────────────┘                 │
                └──────┬───────┘                                │
                       │ Yes                                    │
                     ( ◯ )◀───────────────────────────────────┘
                       │
                ┌──────────────┐
                │    Exit      │
                └──────────────┘
```
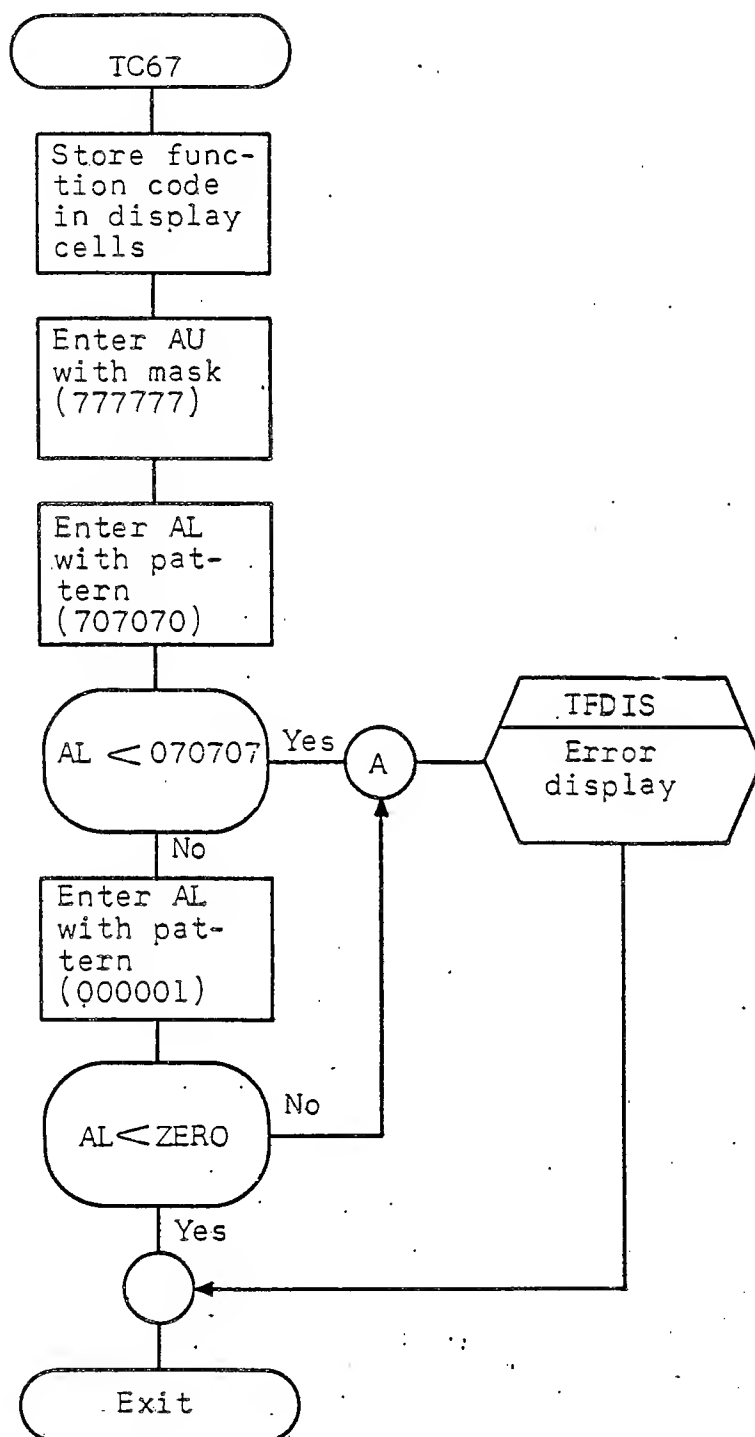
TC67:   JUMP TO Y IF MEMORY GREATER THAN AL

67 XXXX
Y

SPECIFICATION SYMBOL
SB-10163

TITLE: TF70 - ENTER A LOWER WITH CONSTANT (SIGN EXT.) (70xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF70   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by TLR   DATE: 8 December 1967

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 40

DESCRIPTION:

This subroutine checks the Enter A Lower With Constant (Sign Extended) command. AU is entered with the correct, test-pattern constant, and an ENTALK command is executed. Validity is checked by comparing AL to the associated test pattern, and if correct, the above sequence is repeated until all patterns have been checked. An exit is then made to the executive routine (COMA). If an error is detected, AU will contain the correct pattern, AL the incorrect pattern, and an exit is made to the display subroutine. With PROGRAM STOP 0 set, CO will contain the function code, and the error may be evaluated. Upon return to this subroutine (TF70) an exit is made to the executive routine (COMA) to check for program continuance or the recycling of this subroutine.

SPECIFICATION SYMBOL
SB-10163

TITLE: TF70

INPUT PARAMETERS (Listed Sequentially):
COMA

TEST PATTERNS	
TPAT	777777
TPAT1	000000
TPAB1	000001
TPAB1+1	777776
TPAK5	775252
TPAK6	002525
TPAK7	777070
TPAK7+1	000707

OUTPUT PARAMETERS (Listed Sequentially):
BUFF1

BUFF2

TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA (EXEC)

TFDIS - Error Display

SYSTEM DATA REFERENCES:
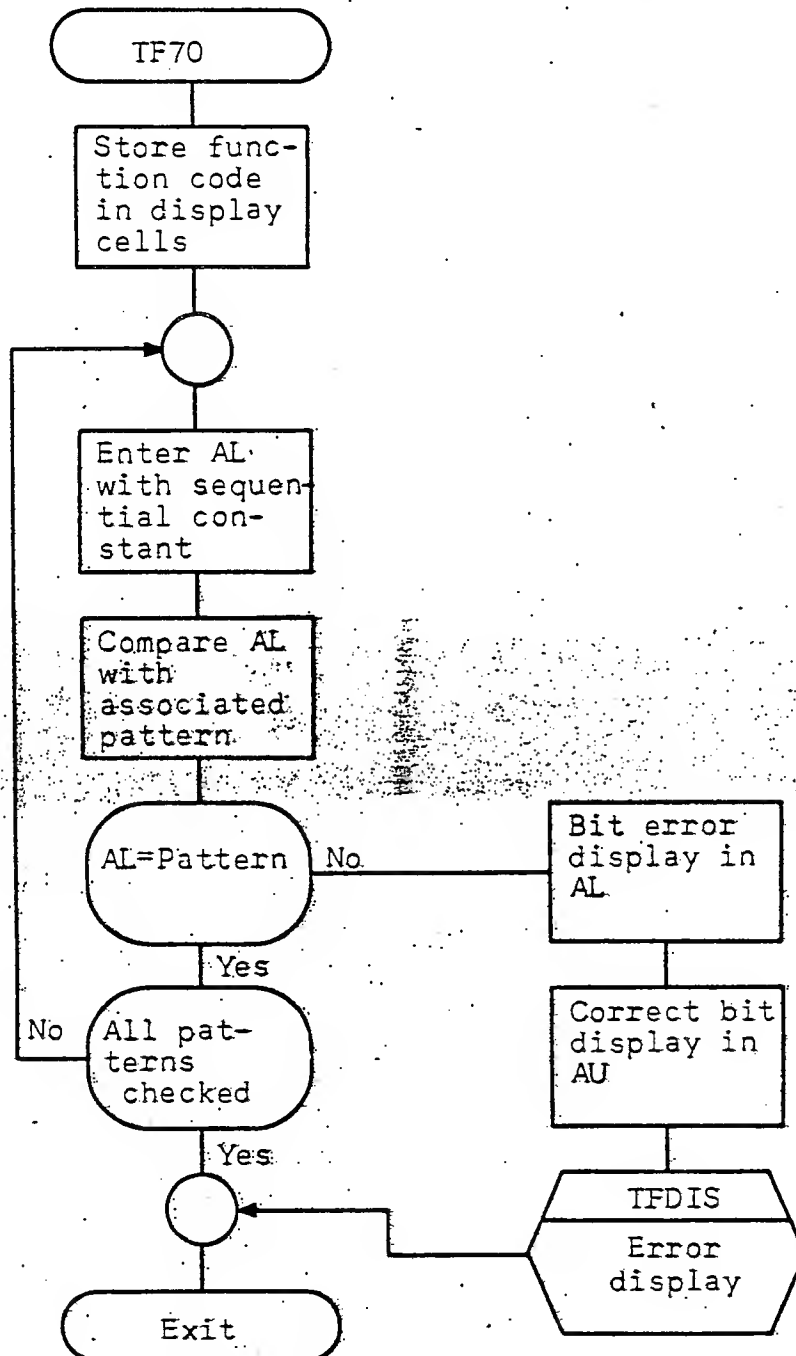
ALARMS AND/OR REMARKS:
ERROR DISPLAY - PROGRAM STOP 0 set
    Correct information in AU
    Incorrect information in AL
    Function Code (70xxxx) in CO
    PROGRAM SKIP 4 - set for console error display only
        not set for error typeout (Function
        Code 70)
    PROGRAM SKIP 0 not set - continue test; if set -
        recycle subroutine (TF70)

A-1975

| SPECIFICATION SYMBOL |
| SB-10163 |


```
                    TF70

              Store func-
              tion code
              in display
              cells

                   ○

              Enter AL
              with sequen-
              tial con-
              stant

              Compare AL
              with
              associated
              pattern

           AL=Pattern ──No──→  Bit error
                                display in
                                AL
                 │Yes
                                Correct bit
     No    All pat-            display in
           terns              AU
           checked
                 │Yes                TFDIS
                                   Error
                   ○ ←─────────    display

                 Exit
```

TF70:   ENTER AL WITH CONSTANT (SIGN EXT.)

SPECIFICATION SYMBOL
SB-10163

TITLE: TF71 - ADD A LOWER PLUS CONSTANT (SIGN EXT.) (71xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF71   KEY:_____ IS LABEL DUPLICATE? No

PROGRAMMER: FWS modified by TLR   DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 26

DESCRIPTION:

This subroutine checks the Add A Lower Plus Constant (Sign
Extended) command. AL is entered with a constant. An ADDALK
command is executed. Validity is checked by entering AU with
the correct, associated test pattern and comparing AL with that
same pattern. If correct, the next ADDALK command is executed.
This sequence is repeated until all patterns have been checked.
An exit is made to the executive routine (COMA). If an error
is detected AU will contain the correct pattern, AL the incorrect
pattern, and an exit is made to the display subroutine. With
PROGRAM STOP O set, CO will contain the function code and the
error may be evaluated. Upon return to this subroutine (TF71) an
exit is made to the executive routine (COMA) to check for program
continuance or the recycling of this subroutine.

SPECIFICATION SYMBOL
SB-10163

TITLE: TF71

INPUT PARAMETERS (Listed Sequentially):
COMA

TEST PATTERNS
TPAT1	000000
TPAK2	002222
TPAK4	003333
TPAS4	000002

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1

BUFF2

TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA (EXEC.)

TFDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY - PROGRAM STOP 0 set
               Correct information in AU
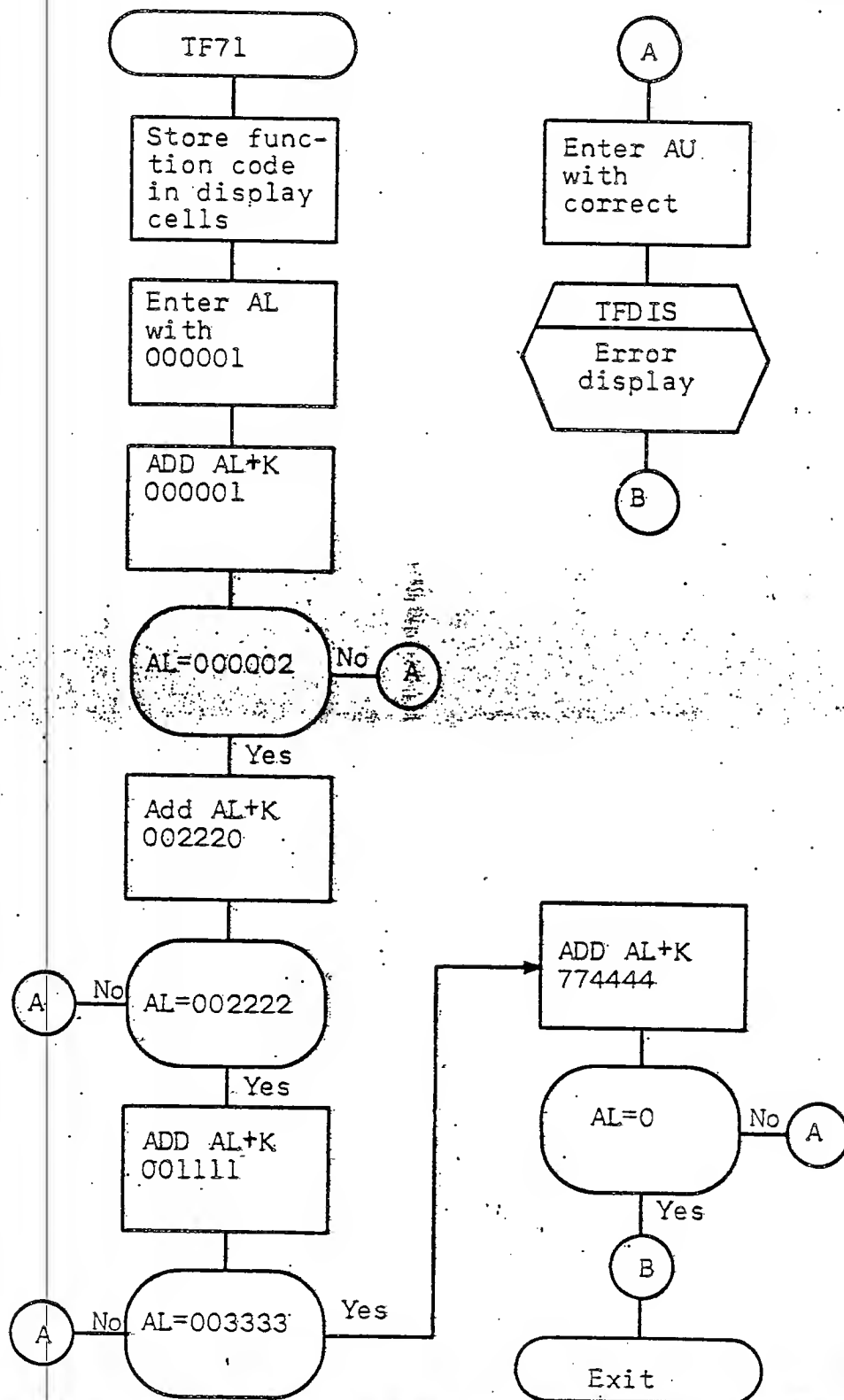   Incorrect information in AL
               Function Code (71xxxx) in CO
               PROGRAM SKIP 4 - set for console error display only
                               not set for error typeout (Function
                               Code 71)
               PROGRAM SKIP 0 not set - continue test; if set -
                               recycle subroutine (TF71)

SPECIFICATION SYMBOL
SB-10163

TF71

Store function code in display cells

Enter AL with 000001

ADD AL+K 000001

AL=000002 — No → A

Yes

Add AL+K 002220

A ← No — AL=002222

Yes

ADD AL+K 001111

A ← No — AL=003333 — Yes →

A

Enter AU with correct

TFDIS
Error display

B

ADD AL+K 774444

AL=0 — No → A

Yes

B

Exit

TF71: ADD AL+K (SIGN EXTENDED)   71XXXX
                                    Y

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PROGRAM DATA PAGE

SPECIFICATION SYMBOL
SB-10163

TITLE: TS73 - ENTER SPECIAL REGISTER (5073xx)

DECK IDENTIFIER: FACT

CS.1 LABEL: TS73   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: PMC/HWM modified by TLR   DATE: 8 December 1967

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 34

DESCRIPTION:

This subroutine checks the Enter Special Register Command. A constant is entered into the Special Register with an ENTSR command. Validity is then checked by storing the contents of the SR in a test cell, entering the content of the test cell into AL, and the associated, test pattern into AU. A Compare is then made of AL and the associated test pattern, and if correct, the next pattern is entered into the SR. This is repeated until all patterns have been checked. An exit is then made to the executive routine (COMA). If an error is detected, AU will contain the correct pattern, AL the incorrect pattern, and an exit is made to the display subroutine. With PROGRAM STOP 0 set, CO will contain the function code and the error may be evaluated. Upon return to this subroutine (TS73) an exit is made to the executive routine (COMA) to check for program continuance or the recycling of this subroutine.

SPECIFICATION SYMBOL
SB-10163

TITLE: TS73

INPUT PARAMETERS (Listed Sequentially):

COMA

TEST PATTERNS

TPAT1	000000
TPAB1	000001
TPAS4	000002
TPAS5	000004
TPAS6	000007
TPAR	TEST CELL

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1

BUFF2

BUFF3

BUFF4

TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA (EXEC)

TSDIS – Error Display

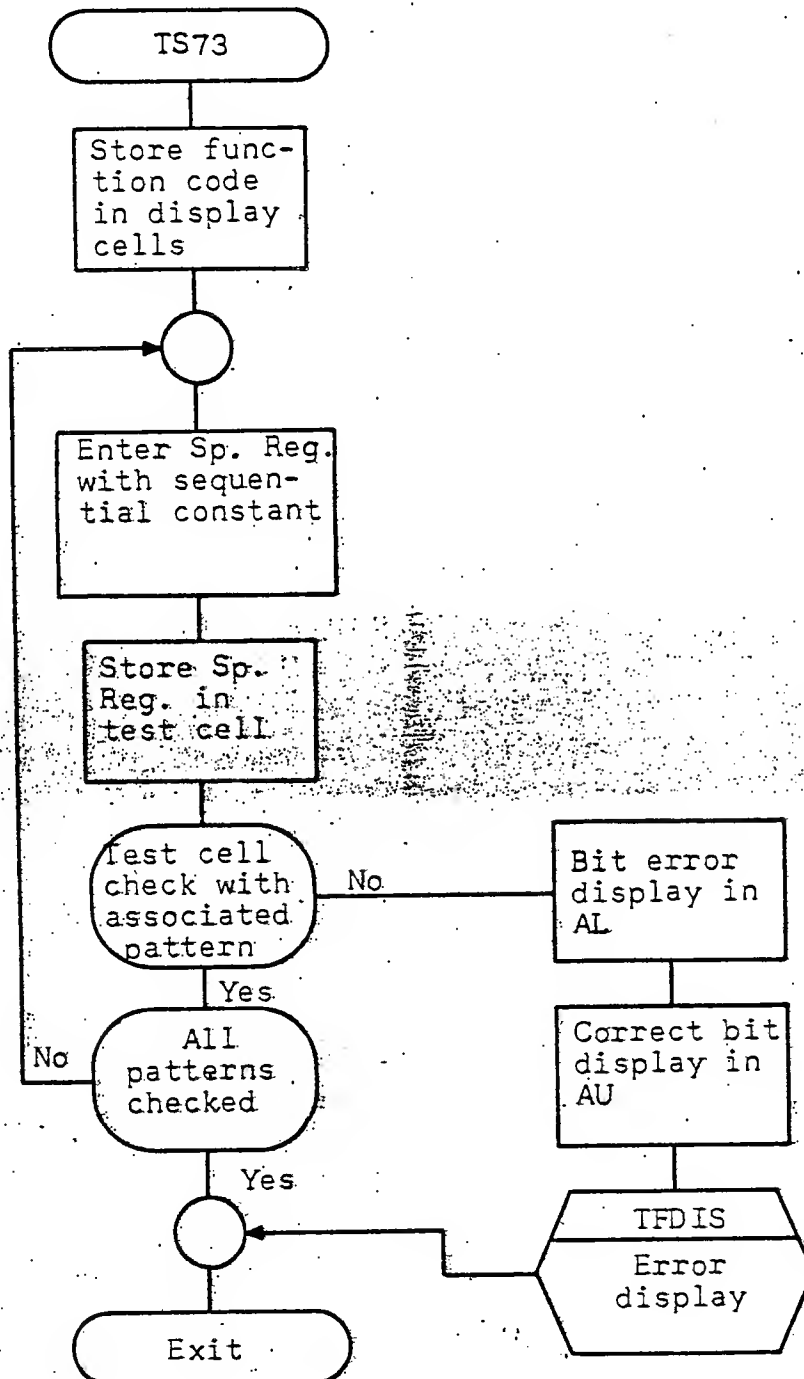**SYSTEM DATA REFERENCES:**

ALARMS AND/OR REMARKS:

ERROR DISPLAY – PROGRAM STOP 0 set
Correct information in AU
Incorrect information in AL
Function Code (5073xx) in CO
PROGRAM SKIP 4 – set for console error display only
not set for error typeout (Function
Code 5073)
PROGRAM SKIP 0 not set – continue test; if set –
recycle subroutine (TS73)

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SPECIFICATION SYMBOL
SB-10163

```
        ( TS73 )
           |
   +----------------+
   | Store func-    |
   | tion code      |
   | in display     |
   | cells          |
   +----------------+
           |
          (O)<----------+
           |            |
   +----------------+   |
   | Enter Sp. Reg. |   |
   | with sequen-   |   |
   | tial constant  |   |
   +----------------+   |
           |            |
   +----------------+   |
   | Store Sp.      |   |
   | Reg. in        |   |
   | test cell      |   |
   +----------------+   |
           |            |
   ( Test cell  )  No   +----------------+
   ( check with )------>| Bit error      |
   ( associated )       | display in     |
   ( pattern    )       | AL             |
           | Yes        +----------------+
   ( All        ) No            |
   ( patterns   )------> +----------------+
   ( checked    )        | Correct bit   |
           | Yes         | display in    |
          (O)<---+       | AU            |
           |      |       +----------------+
        ( Exit )  |              |
                  |        / TFDIS     \
                  +-------<  Error      >
                          \  display   /
```

TS73:   ENTER SPECIAL REGISTER

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SPECIFICATION SYMBOL

SB-10163

TITLE: TF73 - B JUMP (73xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF73   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by TLR   DATE: 8 December 1967

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 27

DESCRIPTION:

This subroutine checks the B Jump commmand. First AU and the
test area (TF73 - 10_8 addresses) are cleared to 0's. B is
entered with a constant, in the test area (TB73 plus B) and a
return is made to the address containing the B Jump. The Jump
and Store is repeated until the decrementation of B is complete.
Validity is then checked by entering AL with TB73 (test area) and
checking for the proper contents. If correct, the next
sequential test pattern is entered into B and the above operation
is repeated until all test patterns have been used. If all
executions are correct, an exit is made to the executive routine
(COMA).

SPECIFICATION SYMBOL
SB-10163

TITLE: TF73

INPUT PARAMETERS (Listed Sequentially):

COMA

TEST PATTERNS
TPAT1   000000
TB73   TEST AREA

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1

BUFF2

TEX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

COMA (EXEC)

TFDIS — Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY - PROGRAM STOP 0 set
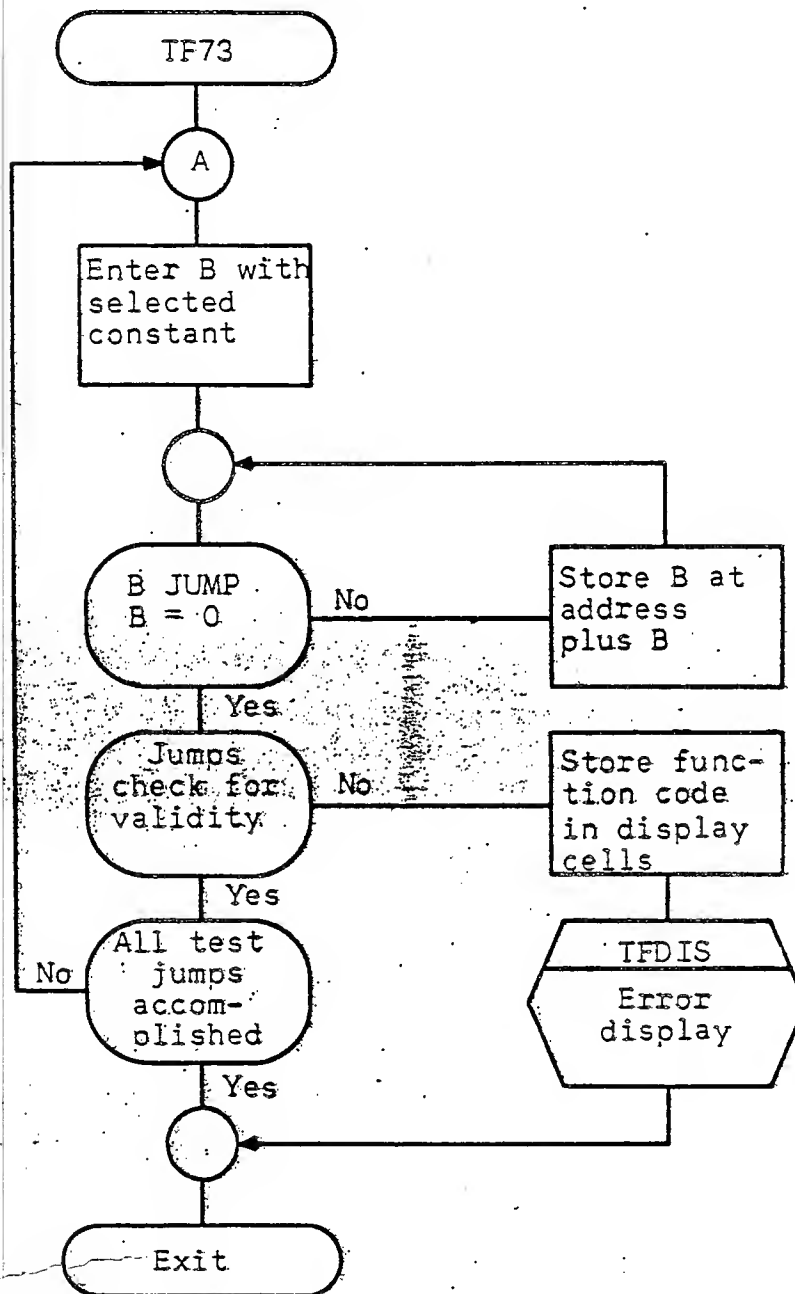   Correct information in AU
             Incorrect information in AL
             Function Code (73xxxx) in CO
         PROGRAM SKIP 4 - set for console error display only
                         not set for error typeout (Function
                         Code 73)
         PROGRAM SKIP 0 not set - continue test; if set -
                                  recycle subroutine (TF73)

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SPECIFICATION SHEET

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SPECIFICATION SYMBOL
SB-10163

```
                    ┌──────────────┐
                    │     TF73     │
                    └──────┬───────┘
                           │
                    ┌──────┴──────┐
            ┌──────▶│      A      │
            │       └──────┬──────┘
            │              │
            │     ┌────────┴────────┐
            │     │ Enter B with    │
            │     │ selected        │
            │     │ constant        │
            │     └────────┬────────┘
            │              │
            │           ( ○ )◀──────────────────┐
            │              │                     │
            │      ╭───────┴───────╮    ┌────────┴────────┐
            │      │  B  JUMP      │ No │ Store B at      │
            │      │  B = 0        │───▶│ address         │
            │      ╰───────┬───────╯    │ plus B          │
            │           Yes │           └─────────────────┘
            │      ╭───────┴───────╮    ┌─────────────────┐
            │      │  Jumps        │ No │ Store func-     │
            │      │  check for    │───▶│ tion code       │
            │      │  validity     │    │ in display      │
            │      ╰───────┬───────╯    │ cells           │
            │           Yes │           └────────┬────────┘
            │      ╭───────┴───────╮    ⬡─────────────────⬡
            │ No   │  All test     │    │     TFDIS       │
            └──────│  jumps        │    ├─────────────────┤
                   │  accom-       │    │     Error       │
                   │  plished      │    │     display     │
                   ╰───────┬───────╯    ⬡────────┬────────⬡
                        Yes │                    │
                         ( ○ )◀─────────────────┘
                           │
                    ┌──────┴──────┐
                    │    Exit     │
                    └─────────────┘
```

TF73:   B JUMP

SPECIFICATION SYMBOL
SB-10163

TITLE: TF74 - TEST STORE ADDRESS (74xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF74   KEY: _____ IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by TLR   DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 52

DESCRIPTION:

This subroutine tests the Store Address command (Function Code 74).
A series of test patterns are entered into A Lower and a STRADR
command is executed using a test cell. The contents of the test
cell are entered into A Upper, and through the use of a Compare
Mask the execution of the Store Address is verified. If the
execution was proper, the next pattern is checked, and on
completion of all patterns an exit is made to the executive
routine (COMA). If during the verification of any of the series
of executions an error is detected, A Upper is entered with the
correct information and A Lower contains the incorrect information
and an exit is made to the display subroutine (TFDIS). Upon
returning to this subroutine (TF74) an exit is made to the
executive routine (COMA) for continuance of the test or re-
cycling of this subroutine (TF74).

A-1974

SPECIFICATION SYMBOL
SB-10163

TITLE: TF74

INPUT PARAMETERS (Listed Sequentially):
COMA

	TEST PATTERNS	
	TPAT	777777
	TPAT5	007777
	TCO1	777777
	TPAT1	000000
	TPAK	002020
	TPAK1	005050
	TPAK3	007070
	TPAT6	707070
	TPAB5	010001
	TPAR	TEST CELL

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1

BUFF2

TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):
COMA (EXEC)

TFDIS — Error Display

SYSTEM DATA REFERENCES:

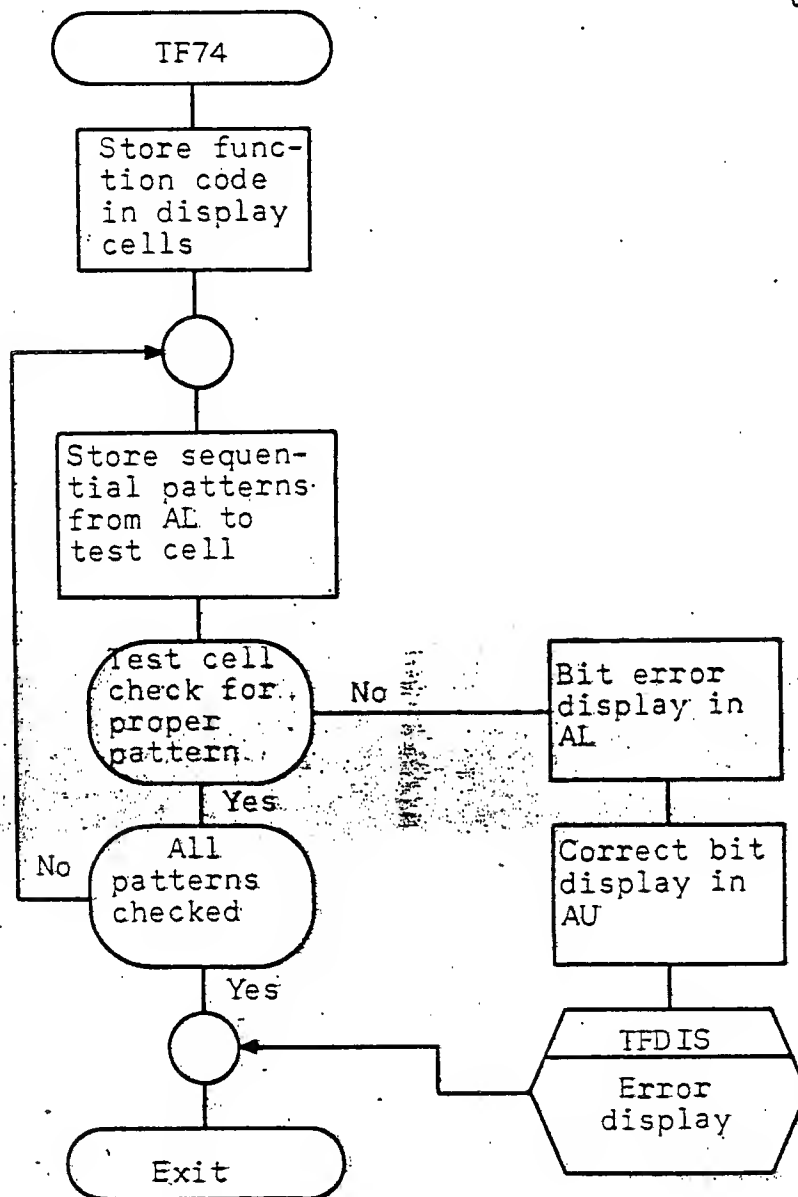ALARMS AND/OR REMARKS:

ERROR DISPLAY — PROGRAM STOP 0
   Correct bit configuration in AU
   Incorrect bit configuration in AL
   Function Code (74xxxx) in CO
   PROGRAM SKIP 4 - set for console error display only
            not set for error typeout (Function
            Code 74)
   PROGRAM SKIP 0 not set - continue test; if set -
            recycle subroutine (TF74)

SPECIFICATION SYMBOL
SB-10163

```
            ( TF74 )
               |
        ┌───────────────┐
        │ Store func-   │
        │ tion code     │
        │ in display    │
        │ cells         │
        └───────────────┘
               |
              ( O )◄──────────┐
               |              │
        ┌───────────────┐     │
        │ Store sequen- │     │
        │ tial patterns │     │
        │ from AL to    │     │
        │ test cell     │     │
        └───────────────┘     │
               |              │
         (Test cell       No  │    ┌───────────────┐
          check for ──────────┼───►│ Bit error     │
          proper            │ │    │ display in    │
          pattern)          │ │    │ AL            │
               |            │ │    └───────────────┘
              Yes           │ │           |
         ( All        No    │ │    ┌───────────────┐
           patterns ────────┘ │    │ Correct bit   │
           checked )          │    │ display in    │
               |              │    │ AU            │
              Yes             │    └───────────────┘
              ( O )◄──────────┼──────────|
               |              │      ⬡ TFD IS
            ( Exit )          │        Error
                                       display
```

TF74:   STORE ADDRESS

SPECIFICATION SYMBOL

SB-10163

TITLE: TF75 - TEST STORE SPECIAL REGISTER (75xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF75   KEY: _____   IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by TLR   DATE: 8 December 1967

NUMBER OF L$_4$ OUTPUT INSTRUCTIONS: 75

DESCRIPTION:

This subroutine tests the Store Special Register instruction
(Function Code 75). A number of sequential constants are entered
into the Special Register and the STRSR instruction is executed
and checked for validity. If the execution is proper the next
constant is stored and checked until all have been checked. If
all are correct an exit is made to the executive routine (COMA).
If in checking the store special register instruction an
execution is found to be improper, the correct information is
entered into A Upper, the incorrect information is contained in
A lower, and an exit is made to the display subroutine (TFDIS).
Upon returning to this subroutine (TF75) an exit is made to the
executive routine (COMA) to check for continuing the test or re-
cycling this subroutine (TF75).

SPECIFICATION SYMBOL
SB-10163

TITLE: TF75

INPUT PARAMETERS (Listed Sequentially):
COMA

TEST PATTERNS	
TPAS6	000017
TPAS5	000014
TPAT1	000000
TPAS4	000002

OUTPUT PARAMETERS (Listed Sequentially):

BUFF1

BUFF2

TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):
COMA

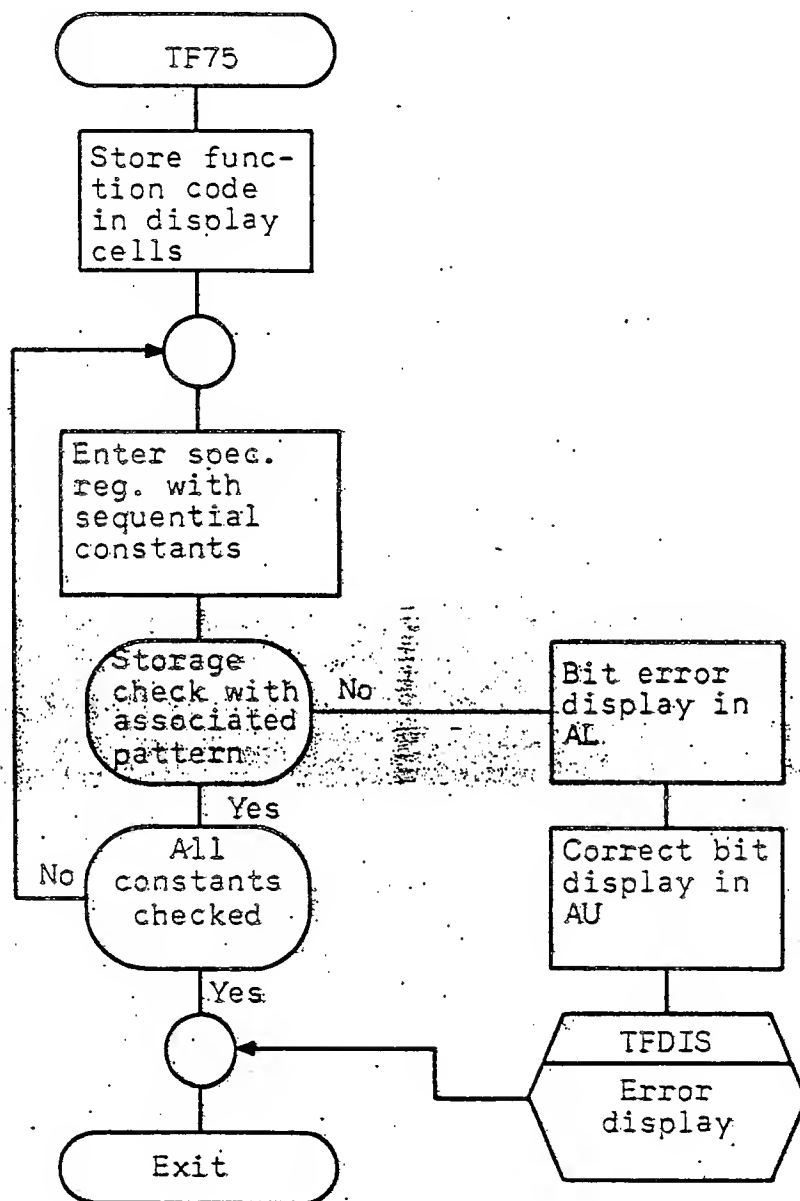TFDIS - Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY

STOP 0 - correct information in A upper
incorrect information in A lower
function code (75xxxx) in CO

PROGRAM SKIP 4 - set for console error display only
not set for error typeout (Function Code 75)

PROGRAM SKIP 0 - not set to continue test
set to recycle subroutine (TF75)

```
                    ┌─────────────┐
                   (    TF75      )
                    └─────────────┘
                          │
                  ┌───────────────┐
                  │ Store func-   │
                  │ tion code     │
                  │ in display    │
                  │ cells         │
                  └───────────────┘
                          │
                         ( )
                          │
                  ┌───────────────┐
                  │ Enter spec.   │
                  │ reg. with     │
                  │ sequential    │
                  │ constants     │
                  └───────────────┘
                          │
                    ╭──────────╮           ┌───────────────┐
                    │ Storage  │    No     │ Bit error     │
                    │ check with├─────────→│ display in    │
                    │ associated│          │ AL.           │
                    │ pattern   │          └───────────────┘
                    ╰──────────╯                   │
                       Yes                 ┌───────────────┐
                    ╭──────────╮           │ Correct bit   │
              No    │ All      │           │ display in    │
            ┌───────│ constants│           │ AU            │
            │       │ checked  │           └───────────────┘
            │       ╰──────────╯                   │
            │          Yes                   ╱─────────────╲
            │          ( )←─────────────────│   TFDIS      │
            │           │                   │   Error      │
            │     ┌───────────┐             │   display    │
            │     │   Exit    │              ╲─────────────╱
            │     └───────────┘
```

TF75:   STORE SPECIAL REGISTER

SPECIFICATION SYMBOL
SB-10163

TITLE: TF76 - TEST RETURN JUMP (76xxxx)

DECK IDENTIFIER: FACT

CS-1 LABEL: TF76   KEY: _____   IS LABEL DUPLICATE? No

PROGRAMMER: PMC modified by TLR   DATE: 8 December 1967

NUMBER OF L_4 OUTPUT INSTRUCTIONS: 21

DESCRIPTION:

This subroutine tests the Return Jump instruction (Function Code 76). A series of RJP commands are executed and checked for validity. If all executions are correct an exit is made to the executive routine (COMA). If the validity check should detect an improper execution an indirect return jump is made to the display subroutine (TF.DIS) and the Function Code (76xxxx) is displayed in CO. Upon returning to this subroutine (TF76) an exit is made to the executive routine (COMA) to check for continuing the test or recycling this subroutine (TF76).

A-1974

SPECIFICATION SYMBOL
SB-10163

TITLE: TF76

INPUT PARAMETERS (Listed Sequentially):
COMA

OUTPUT PARAMETERS (Listed Sequentially):
BUFF1

BUFF2

TFX

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):
COMA (EXEC)

TFDIS — Error Display

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

ERROR DISPLAY

STOP 0 — Function Code (76xxxxx) in CO
PROGRAM SKIP 4 — set for console error display only
               not set for error typeout (Function Code 76)
PROGRAM SKIP 0 — not set to continue test
               set to recycle subroutine (TF76)

1-1975